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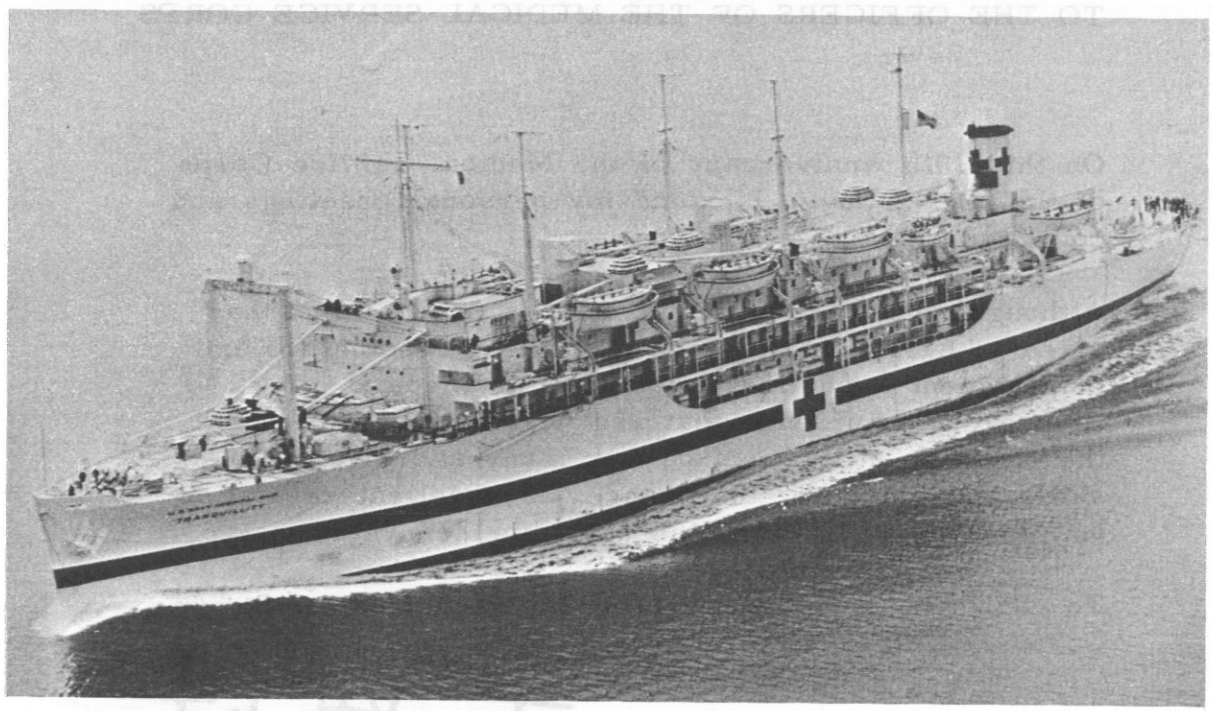

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THE SECRETARY OF THE NAVY
WASHINGTON

TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

On this 19th Anniversary of the Medical Service Corps of the U. S. Navy, I extend my personal greetings and congratulations to all of you.

Although relatively small in number, your Corps has risen to every challenge involved in the scientific and management aspects of a world-wide medical effort. I have every confidence that you will continue, through the effective utilization of your many and diversified skills and abilities, to enhance the excellent reputation you have earned during the past nineteen years.

To each and every member of the Navy Medical Service Corps--HAPPY BIRTHDAY!

Paul H. Nitze

PAUL H. NITZE

THE SURGEON GENERAL OF THE NAVY

WASHINGTON

TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

On this 19th Anniversary of the establishment of the Medical Service Corps, I wish to express my sincere congratulations to all of you.

As Surgeon General of the Navy, it gives me great pleasure to extend the traditional "WELL DONE" for the successful accomplishment of the various demands placed upon your skills and abilities. In every endeavor to which you have devoted yourselves, you have rendered outstanding service, both as individuals and as a group. It is, therefore, a pleasure to convey to you my appreciation and that of the entire Medical Department, and this I do with complete reliance on your continuing loyalty and devotion to duty.

To each and every one of you, wherever you may be serving, I extend my warmest regards and wish you a HAPPY BIRTHDAY!

R. B. BROWN

United States Navy
MEDICAL NEWS LETTER

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Policy

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Navy Department, Washington, D.C. 20390 (Code 18), giving full name, rank, corps, and old and new addresses.

FRONT COVER: USS TRANQUILITY (AH-14). Commissioned on 24 April 1945, this hospital ship was the first of the "HAVEN CLASS" floating hospitals. Within its almost two-block long hull she contained the latest developments in engineering and medical science, including the most modern equipment for air conditioning and waste disposal. During the shakedown cruise the crew had intensive drill in the embarkation of sand dummies as patients from various types of small ships and transferring them according to their tagged designations to the appropriate wards. The TRANQUILITY sailed via Pearl Harbor to Ulithi where she served as a station hospital several days from 22 July onward, receiving and treating patients from the fleet. She next was ordered to Peleliu to pick up 166 survivors, particularly burn cases, from the torpedoed USS INDIANAPOLIS for transfer to Guam. In mid-August she joined the Third Fleet, helping to treat and evacuate prisoners of war held by the Japanese, eventually taking 776 patients for treatment and transfer from Guam to San Francisco. During the rest of 1945 she carried medical evacuees and passengers from Okinawa and Guam to the United States. The ship's operations report stated that the job crane hoists proved to be the most convenient, efficient, and rapid means of embarking stretcher cases. Only one of the 10 available had to be used; but if the disembarking craft had been the smaller LCVP's, more of the hoists and patient handling facilities on each side of the TRANQUILITY could have been utilized. The ship was decommissioned on 21 July 1946, and turned over to the National Defense Reserve Fleet on 4 March 1961. On 1 September 1961 she was stricken from the Navy Register and permanently transferred to the Maritime Administration.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

MISSILES IN THE HEART*

A TWENTY-YEAR FOLLOW-UP REPORT OF WORLD WAR II CASES

Edward F. BLAND MD† and Gilbert W. Beebe PhD,‡ Boston, Massachusetts and Washington, D.C. New Engl J Med 274: 1039-1046, May 12, 1966.

This report concerns the fate of 40 soldiers with foreign bodies in the heart from World War II. The original study began in a small way in North Africa and Italy during the war. At that time an opportunity was presented to assemble data on 100 soldiers who had wounds of the heart and recovered; among them was a small group who were sent home from overseas with metallic fragments in the myocardium.§ In 1957, at the suggestion of the National Research Council, this earlier study was extended to include the total experience of the war, and this is now complete for a twenty-year period.

During both World Wars and in the intervening years opinion about the management of retained missiles in the heart has been divided. The bolder surgeons of World War I favored their removal. Delorme, in France (1917), cited 13 operations, with only 3 deaths, which included the successful removal of fragments from the right cavities of the heart. In the following year LeFort reported the first case in France of a missile removed from the left ventricular cavity, and he recorded a series of 9 consecutive cardiotomies for foreign-body removal with only 1 death.

Nonetheless, the advent of World War II found opinion still divided. Decker (1939) reported that the subsequent mortality from foreign bodies in the heart was 20 percent and that death from operations for their removal had been of the same magnitude, with the probability that many unsuccessful attempts had escaped publication. Sauerbruch, in Germany (1941), advised the removal of all foreign bodies from the heart to forestall the later complications and reported a series of 105 cases with an operative mortality of 8 percent. In England, however, Turner (1942) advised caution, admonishing that "it would seem to be a good rule to leave the foreign body alone unless the heart continues to rebel against its presence." In support of this opinion he cited the case of a soldier who sustained in 1917 a machine-gun bullet in the wall of the left ventricle reporting twenty-three years later, in 1940, that he was quite well, although he confessed to being a little tired—"a result of the present war, not the last one."

The policy generally followed in the United States forces in World War II was to remove missiles from the heart, including those located within the cavities that were recognized at the time of initial thoracotomy, but to make no attempt to remove them in patients who had survived the immediate dangers of their implantation. Thus, there is a documented group from which it has been possible to assemble the present series.

The sources of material were the personal rosters kept by one of us (E.F.B.) in the Mediterranean Theater, by Dr. Dwight E. Harken in Europe and by Dr. Brian B. Blades at the Walter Reed General Hospital in Washington and the diagnostic files of the Surgeon General of the Army. Through these lists 40 soldiers returned to civilian life with missiles in the heart were identified. The follow-up study utilized in large part the facilities of the Veterans Administration and the Department of Defense under terms of access granted to approved projects in the National Academy of Sciences-National Research Council program of follow-up studies on the military-veteran population. Full information on each man was assembled from the time of his induction into the service. These data included the details of his wound, its management in the military installa-

* From the Massachusetts General Hospital, Boston, and the Division of Medical Sciences of the National Research Council, Washington.

This study, which was part of a program of medical follow-up studies organized by the National Academy of Sciences-National Research Council at the request of the Veterans Administration, the Department of Defense and the Public Health Service, was supported by the Veterans Administration.

† Clinical professor of medicine, Harvard Medical School; consulting visiting physician, Massachusetts General Hospital.

‡ Statistician, Division of Medical Sciences, National Academy of Sciences-National Research Council.

§ We are indebted to Drs. Edward D. Churchill and Perrin H. Long, surgical and medical consultants respectively to the Surgeon General, United States Army in the Mediterranean Theater in World War II, for their encouragement and authorization of the initial study.

TABLE 1. *Missiles in the Heart.*

Case No.	Age	Date of Wound	Size and Location of Foreign Body	Symptoms (1961-1962)	Work Capacity (1961-1962)
1	25	12/42	Bullet in anterior wall of rt. ventricle	None	Full-time draftsman
2	27	3/43	Foreign body, 2 x 0.5 mm., in anterior wall of rt. ventricle	Vague chest ache	Full-time attendant in service station
3	22	4/43	Foreign body, 2 x 5 mm., in apex of left ventricle	None	Full-time gate tender
4	34	4/43	Bullet (.30-cal.) in posterior wall of left ventricle	None (foreign body removed in 6 mo.)	Full-time inspector
5	32	5/43	Foreign body, 5 x 10 mm., in posterior wall of rt. atrium (discovered 1 mo. later)	None	Full-time aircraft inspector
6	29	3/44	Foreign body, (small) in lateral wall of left ventricle (discovered 1 mo. later)	None	Full time
7	20	4/44	Foreign body, 20 x 12 mm., migrated from left pulmonary to rt. pulmonary artery	Recurring pulmonary infections; erosion of rt. bronchus; pneumonectomy	Part-time clerk
8	23	4/44	Foreign body, 5 mm., in left ventricle near septum	None	Full-time farmer
9	20	5/44	Foreign body, (small) in rt. ventricle near pulmonary conus	None	Full-time lens grinder
10	25	6/44	Foreign body, 11 x 10 mm., in left ventricle near root of aorta; not found on exploration in 10/44	Chest aches; severe anxiety	None (anxiety)
11	30	6/44	Foreign body (small) in wall of rt. ventricle	None from heart (amputee + other disabilities)	Totally disabled
12	19	7/44	Foreign body, 8 x 18 mm., in anterior wall of rt. ventricle	None from heart; resection of left lower lobe	Full-time attendant in service station
13	24	7/44	Foreign body, 10 x 10 x 20 mm., in left anterior wall near pulmonary conus; exploration 1/45; not removed (encapsulated)	None	Full-time clerk
14	24	7/44	Foreign body (small) in wall of left ventricle (discovered later).	Patient ails in non-specific fashion	Part-time odd jobs
15	27	8/44	2 foreign bodies (small) in left ventricle at root of aorta and posterior at junction of left atrium and left ventricle	None from heart; severe psychoneurosis	Totally disabled (anxiety)
16	31	4/44	Foreign body (small) in wall of rt. ventricle	Aches in rt. side of chest	Full time
17	27	8/44	Bullet, 7 x 10 mm., against rt. atrium	None	Full time
18	20	9/44	Foreign body, 5 x 10 mm., extending outward from heart wall; aortic-valve injury	Free aortic regurgitation; blood pressure 120/30/0; dyspnea	Part time
19	19	9/44	Foreign body, 5 x 5 mm., in wall of rt. ventricle near septum	None	Full-time optician
20	30	9/44	Foreign body, 4 x 5 mm., in wall of rt. atrium	None	Full-time accountant
21	19	10/44	Foreign body, 2 x 4 mm., in rt. ventricle near atrioventricular groove	None	Full-time fisherman
22	21	10/44	Foreign body (small) posteriorly in pericardium or wall	Vague chest ache	Full time
23	32	11/44	Foreign body, 3 x 10 mm., near coronary sinus; at exploration of rt. ventricle 3 mo. later, not found	None	Full-time postmaster
24	20	12/44	Foreign body, 5 x 10 mm., in posterior wall of left ventricle near apex; at exploration 2 mo. later, not found	Chest aches	Part time
25	19	12/44	3 foreign bodies (small) in lateral wall of left ventricle	None	Full-time social-service worker
26	23	12/44	Foreign body, 6 x 7 mm., in posterior lateral wall of left ventricle	None	Full-time salesman
27	24	12/44	Foreign body, 5 x 9 x 10 mm., in rt. ventricle near apex; removal attempted twice 1 and 2 mo. later; firmly fixed	Vague chest aches	Part time
28	28	12/44	Bullet, 10 x 10 x 30 mm., in rt. ventricle near septum	Lobectomy for bronchiectasis in 1953	Full time
29	32	1/45	Foreign body, 6 x 10 mm., in rt. ventricle	None	Full time
30	33	1/45	Foreign body, 6 x 6 x 10 mm., in diaphragmatic wall of left ventricle	None	Full-time taxi driver
31	33	1/45	Foreign body, 6 x 7 x 16 mm., in posterior wall of left ventricle	Severe anxiety state about foreign body	Full-time guard
32	19	2/45	Foreign body, 5 x 10 x 10 mm., in anterior wall of rt. ventricle	None; later pulmonary tuberculosis arrested	Full time
33	33	3/45	Foreign body, 10 x 10 x 12 mm., in wall of rt. ventricle; recurrent pericarditis 4 mo. later	None; mild anxiety	Full time
34	19	4/45	Foreign body, 2 x 5 mm., in wall of rt. ventricle	None	Full-time truck driver
35	36	4/45	Small sliver in left ventricle anteriorly near mitral ring	Severe anxiety neurosis; many pains	None (housebound)
36	24	4/45	Foreign body, 5 x 10 mm. in periaortic tissue	None	Full-time clerk
37	33	4/45	Bullet in posterior wall of left ventricle	Severe anxiety state over bullet	None (anxiety)
38	20	5/45	Foreign body, 10 x 20 mm., in wall of rt. atrium	Bullet removed from atrial wall in 7/54, with partial relief of "pleuritic" pain	Full-time salesman
39	25	5/45	Foreign body, 6 mm., in wall of rt. atrium	Severe anxiety over foreign body; chest aches	None (anxiety)
Special Case:					
40	20	11/36	Multiple 4-mm. U-shaped foreign bodies in wall of rt. side of heart (4) and in rt. lung (10) ("zipper fragments")	Vague chest aches	Full time

tions overseas and at home and the results of all subsequent studies in Veterans Administration hospitals. In a number of men further special examinations, x-ray studies and electrocardiograms were made at our request. Finally, personal communications in response to questionnaires were received in 1961–1962 from many of these men in which they discussed with considerable insight their own anxieties and reactions to living with a missile in the heart.

All 40 veterans have survived, and the record is up to date (January, 1965) in every case. The pertinent data are summarized in Table 1.

Clinical Features

The size and shape of the missiles varied from small shell fragments a few millimeters in diameter to .30-caliber machine-gun bullets. In over half the cases the fragment measured 10 mm. or more in its greatest diameter. There were 5 in which a bullet was located in the heart wall. Multiple fragments (2, 3 and 4 respectively) were found in the myocardium

of 3 patients. As would be expected, the majority of the missiles were situated in the wall of the ventricles: 19 in the left ventricle; and 14 in the right ventricle. Five were found in the right atrial wall, 1 in the pulmonary artery, and 1 in the perivascular tissue of the ascending aorta. In no case did it seem likely that the foreign body protruded into a heart chamber.

In 2 patients, in each of whom a sliver of metal had lodged in the myocardium at the base of the heart, such violent movement with each cardiac systole was observed fluoroscopically as to suggest that the fragment was in or near a valve structure. In fact, because of this dynamic action it was difficult to obtain on films an image free of distortion. In spite of this unusual degree of movement, the subsequent course of these 2 subjects suggests that the fragment is well fixed and that this element of motion has had no added deleterious effect upon the heart.

Electrocardiograms (Table 2) were taken in most cases shortly after the chest injury, usually in field or evacuation hospitals, and in some, these early tracings directed attention for the first time to the cardiac lesion. On 5 soldiers no records were available until a considerably later date because of special circumstances, one of which had to do with prisoner-of-war status. In 14 the tracings gave no clue to the presence of the foreign body, even though several of these patients had a bullet in the heart wall.

The electrocardiographic abnormality most often observed was the inversion of the T waves in all leads (3 limb leads and CF_4)* characteristic of acute pericarditis (14 cases). Occasionally, the T-wave pattern was that of focal injury, but in only 1 patient was there absence of R waves in addition to the abnormality of the T waves that is indicative of transmural injury, and this is the only patient in whom the electrocardiographic abnormality is still present twenty years later (Case 8). A temporary delay in atrioventricular conduction with a PR interval of 0.24 second was noted once. In another soldier the Wolff-Parkinson-White syndrome (congenital intraventricular block with short PR interval and a history of paroxysmal atrial tachycardia) discovered at the time of injury remains unchanged twenty years later, and the pattern of hypertrophy of the left ventricle has evolved in a soldier who sustained damage to the aortic valve.

* During the war it was customary to take 3 limb leads and a single precordial lead, from the region of the cardiac apex. The follow-up tracings, however, have included the usual unipolar limb leads and a full set of 6 precordial leads.

Pericardial effusion occurred in 10 patients, and in all but 1, the electrocardiographic pattern supported the diagnosis. In all cases the electrocardiographic abnormalities have disappeared, and in none has either pericardial calcification or constriction developed. Occasionally, the effusion appeared well along in convalescence, even up to four months after the injury. This delayed reaction has also been noted by British investigators: in fact, it was thought to be due in some unexplained fashion to the continued presence of the foreign body, although recovery ultimately ensued. In retrospect it now seems more likely that these delayed reactions during an otherwise favorable recovery represent the so-called postpericardiotomy syndrome—a syndrome that during the war was an unrecognized entity and even now is poorly understood.

TABLE 2. *Electrocardiographic Findings.*

Finding	Early Tracings	Later Tracings
Normal	14*	37
Pericarditis	14	0
Focal injury:		
Abnormal T waves	5	0
Abnormal QRS complexes (also)	(1)	1
Delayed atrioventricular conduction	1†	0
Wolff-Parkinson-White syndrome	1	1
Hypertrophy of left ventricle	0	1

* No electrocardiogram in 5.
† PR interval, 0.24 sec.

Valve injury from a penetrating foreign body occurred in 1 patient, resulting in aortic regurgitation of severe degree (Case 3). A second, similar case of valve injury, not included in this series, was studied by one of us (E.F.B.) after the war in a German soldier. This man had been wounded by a hand grenade explosion during training exercises in 1939, with resultant mitral regurgitation (a Grade 3 apical systolic murmur) and slight cardiac enlargement. A metallic fragment measuring 3 by 12 mm. was subsequently found embedded in the wall of the right ventricle at the base of the heart (Fig. 1). He made an excellent recovery and served throughout the war; later, he sustained a shoulder wound in Belgium and multiple leg wounds in Russia. In 1963 he wrote that he was well, the foreign body and the cardiac murmur remained as before, and he was leading an active life, holding an important judicial post in Bavaria.

Later exploration for removal of the foreign body was undertaken on 8 patients. The results are shown in Table 3. In 3 cases the missile was successfully removed. In the first of these the operation was entirely elective, since the soldier had made an excel-

lent recovery from his chest wound: he was asymptomatic, and the previously inverted T waves in the electrocardiogram had returned to normal. However, because of the large size of the missile (a .30-caliber bullet) it was removed six months after lodgment from the posterior wall of the left ventricle, where it was found to be firmly fixed. Recovery was complete and uneventful except for a temporary inversion of the T waves again for a few months. Twenty years later he is free of symptoms and anxieties and works full time as an inspector. In the second case a fragment, 10 by 20 mm., was removed nine years after lodgment because of recurring pleuritic chest pain. The foreign body was found to be embedded in the wall of the right atrium, without evidence of recent reaction around it. This patient still complains occasionally of the same pain but works full time as a salesman. The third patient (Case 18) is of unusual interest and is described in some detail below.

TABLE 3. *Later Exploration for the Foreign Body.*

Removal
Elective because of size (6 mo.); bullet in posterior wall of left ventricle (Case 4).
Chest pain (9 yr.); missile, 10 x 20 mm., removed from wall of right atrium (Case 38).
Pain and lung infection (15 yr.); erosion from pulmonary artery to right bronchus (Case 7).
Removal Attempted (All Elective)
Foreign body, 5 x 10 mm., palpated in left ventricle (2 mo.); patient collapsed; operation abandoned (Case 24).
Twice (1 and 2 mo.); foreign body in right ventricle, too firmly embedded (Case 27).
Foreign body firmly encapsulated (6 mo.), 10 x 10 x 20 mm., at base of heart; operation abandoned (Case 13).
Not found (3 mo.); fragment, 3 x 10 mm., in right ventricle (Case 23).
Not found (4 mo.); fragment, 10 x 11 mm., near root of aorta (Case 10).

Removal of the foreign body was attempted in 5 other patients but had to be abandoned. In the first of these the missile, measuring 5 by 10 mm., was palpated in the wall of the left ventricle, but the patient collapsed on the operating table and the operation was terminated. In the second, attempts were made one month and again two months after injury to remove a foreign body, 5 by 9 by 10 mm., from the wall of the right ventricle near the cardiac apex, but it was finally decided that it was too firmly fixed to justify extraction. Incidentally, this patient now complains with considerable resentment that he had 2 unnecessary operations during the war. In the third case the foreign body was found to be so firmly embedded in the ventricular wall that its removal was not attempted. In the remaining 2 patients exploration, three and four months, respectively, after injury, failed to locate the fragments.

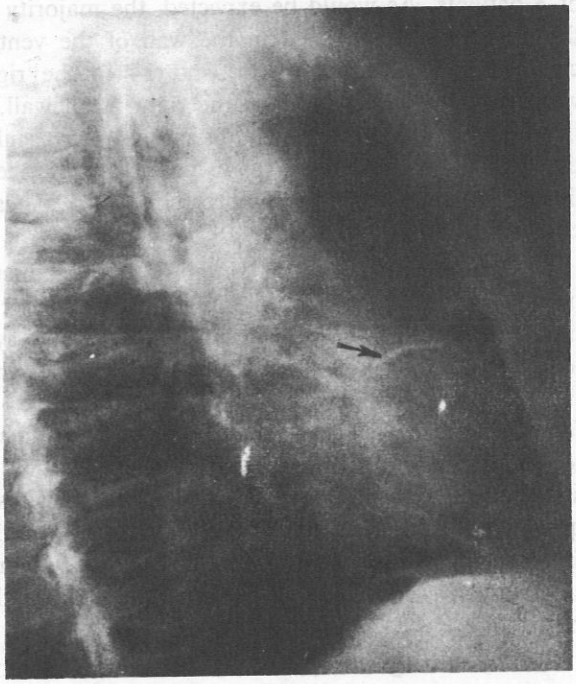


Figure 1. Film Taken in 1951, Showing a Long, Linear Shell Fragment in the Ventricular Myocardium That Damaged the Mitral Valve during Its Penetration of the Heart in 1939.

Present Status

All 40 veterans have survived the two decades since the war. Their present symptoms and their work capacity are shown in Table 1. All receive compensation for disability varying from 10 to 100 percent, a feature that, incidentally, has facilitated our investigation.

In only 1 are there symptoms that can clearly be ascribed to the cardiac injury—namely, in the man with aortic-valve damage. However, he is a stalwart fellow who is able to work at an easy pace with minimal dyspnea and without complaint. Two others have pulmonary impairment, from a lobectomy and a pneumonectomy respectively; another is incapacitated by extensive nerve injury, and another is an amputee. A few have no complaints, but most of the group ail in a nonspecific fashion with chest aches, much apprehension and a low tolerance for work seemingly related to their war injuries. Finally, there is a special group of 5 veterans who are totally incapacitated by a severe anxiety neurosis directly related to the presence of the foreign body in the heart; 1 of these has actually been housebound since the war. More prevalent than this extreme fear is the continuing concern of the majority so well expressed by

one of them: "I have always been aware of this piece of shrapnel in my heart muscle, which I must confess caused me some worry the first few years. Up to this day I have been very cautious not to overexert, and at the same time to exercise with moderation." He works full time at a quiet job.

In no case has angina occurred, nor has cardiac enlargement developed except in the veteran with aortic regurgitation.

In spite of the variable complaints and disability compensation three fourths of the group are fully employed. This represents a remarkable peacetime record for seriously wounded soldiers, most of whom have accepted their limitations and over the years have adjusted themselves to the anxiety of living with a missile in the heart.

A final consideration of some practical importance concerns the insurability in terms of life expectancy of one who harbors a foreign body in his heart muscle. Inquiry concerning this was presented to Dr. George P. Robb, of the Metropolitan Life Insurance Company, who replied as follows: "A veteran whose foreign body in the heart had been removed without residual evidence of injury would be acceptable as a standard insurance risk. If the fragment were still retained and there were no evidence of myocardial infarction, he would be given a small substandard rating."* Thus, there appears to be some insurance advantage, although apparently not very much, in favor of removing metallic fragments from the myocardium. One suspects, however, that a .30-caliber bullet embedded in the heart would be viewed with considerable concern by most underwriters.

Selected Cases

Bullet in the Heart Wall

Case 37. L. W., a 28-year-old man, sustained at Bastogne on December 27, 1944, a penetrating chest wound below the right scapula. Two thousand milliliters of blood was aspirated from the right side of the chest, and a thoracotomy was done the same day in an evacuation hospital, with control of active bleeding from intercostal vessels and from a 2.5-cm. rent in the posterior surface of the right lower lobe. Rib resection, with drainage for a hemorrhagic empyema, was performed on January 1, 1945, and a little later, during convalescence, a bullet in the posterior wall of the heart was located on x-ray study. In April the right lung was decorticated, and he was transferred with a bronchopulmonary fistula 3 months later to Walter Reed Hospital, where the bullet in the heart was found to be in the region of the interventricular septum. By fluoroscopy it was seen to swing in a pendulum-like fashion with each heartbeat. Electrocardiograms were normal. After angiographic study and after further deliberation it was decided to leave the bullet alone. The fistula was closed in March, 1946, but 11 years later, a resection of the basilar segments of the right lung was performed at the Bronx Veterans Administration Hospital for chronic bronchiectasis.

The patient receives 100 percent disability compensation and has not worked since the war but is reasonably well, although he complains of nonspecific chest pain, dyspnea, dizziness and anxiety. The heart is not enlarged; the sounds are of good quality. Interim electrocardiograms have been normal, and there is no indication of cardiac impairment. The location of the bullet is shown on recent films taken in 1963 at our request at the Bronx Veterans Administration Hospital (Fig. 2).† Its position has not changed in 20 years.

Four other soldiers in the series likewise had bullets in the heart. In 1 of these the bullet was later removed electively, and the remaining 3 have had no complications.

Multiple Fragments of Unusual Origin in the Heart and Lungs

Case 40. L. S., a 20-year-old man, had difficulty keeping up with his company during the Tunisian campaign and in July, 1943, was referred for study to the hospital, where he came under our observation.

In 1936, while hunting rabbits, he had been accidentally shot by a friend, with a .22-caliber rifle, from a distance of 50 feet. The bullet entered the 3d intercostal space just to the left of the sternum, penetrated the chest and lodged against and fractured the 8th rib posteriorly on the right side. He was knocked unconscious by the blow and upon recovery found himself in a nearby hospital. For several days he raised bloody sputum and had severe pain in the right side of the chest. During the 3d week the bullet was removed, and he has it at home as a souvenir. He made a good recovery and was inducted into the Army in 1941, but vague chest aches later developed under stress.

* Dr. Robb, formerly medical director and now medical consultant to the Metropolitan Life Insurance Company, studied a number of these patients, on their return from overseas, at the Walter Reed General Hospital, where he was chief of the cardiovascular service during the war.

† We are indebted to Dr. Alan F. Lyon, chief of the Cardiac Section, Veterans Administration Hospital, Bronx, New York, for the recent x-ray films.

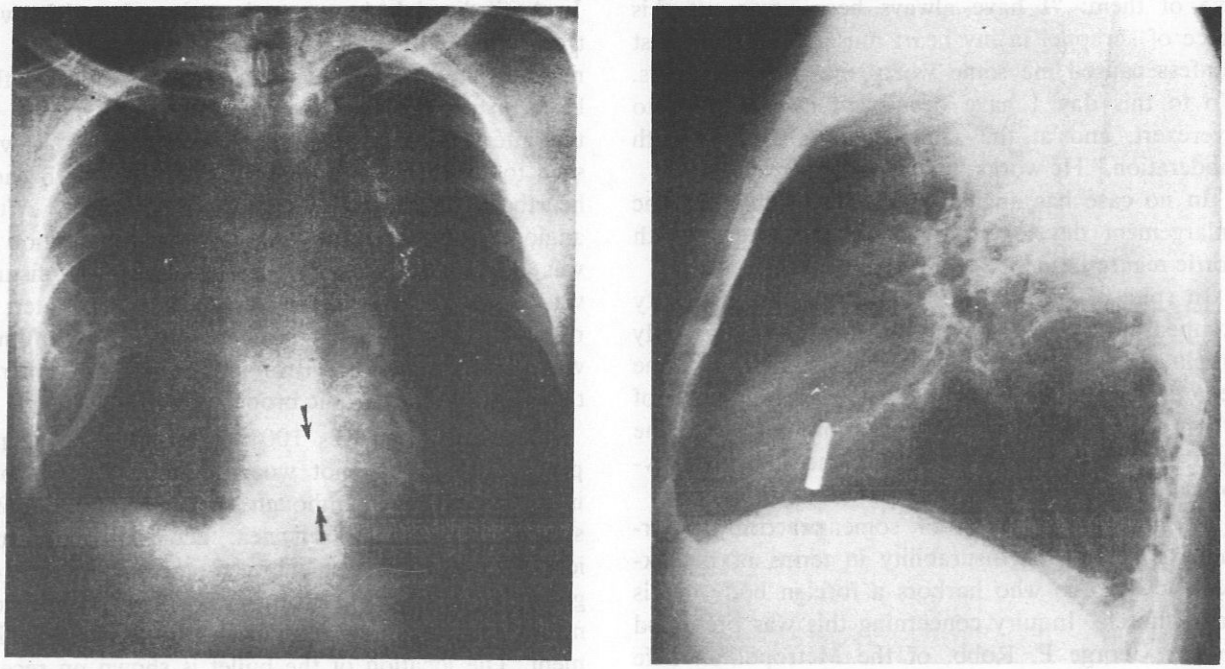


Figure 2. Views of the Chest Taken in 1963, Showing a Bullet in the Posterior Wall of the Heart near the Septum. It moves in a pendulum-like action with each heartbeat, and it has not changed its position since its implantation in 1944.

Examination showed the 1-cm. circular scar of entry and the small operative scar behind. Otherwise he appeared well, and the electrocardiogram was normal. Fluoroscopy and x-ray examination revealed an extraordinary picture of multiple small metallic foreign bodies scattered throughout the right side of the thorax; 13 were identified, all of identical U-shaped configuration. A cluster of 4 surrounded by fibrosis was seen at the right hilus, and there were 3 within the heart shadow in the region of the right atrium (Fig. 3). They moved vigorously with each cardiac pulsation. At 1st glance the nature of the numerous fragments was puzzling. Upon requestioning, however, the patient recalled that at the time of his accident he was wearing a heavy hunting shirt fastened in front by a 15-cm. (6-inch) zipper; the position of the zipper corresponded with the point of entrance of the bullet. He never saw his shirt after the accident and was told that it had been "ruined." In retrospect, it seems that a zipper shattered by the impact of the bullet is the most likely source of these fragments of metal.

This soldier was subsequently wounded in France in 1944, and he was awarded the Silver Star for bravery. He is now in good health and working full time as a painter. The metal fragments present in the heart and lungs for 29 years have caused no trouble.

Valve Injury

Case 18. G. D., a 20-year-old soldier, was severely wounded by shell fragments in Germany on September 18, 1944, with resultant cerebral concussion, fracture of the right humerus and penetrating wounds of the right shoulder and the left anterior aspect of the chest midway between the clavicle and the nipple. During a stormy 1st week bilateral pleural and pericardial effusions developed. The latter required 2 paracenteses (bloody fluid) and, on October 9, a pericardiotomy, with the removal of 500 ml. of serosanguineous fluid for the relief of cardiac tamponade. The foreign body was not located until subsequent x-ray examination revealed the presence of a linear fragment, 5 by 10 mm., in the myocardium at the base of the heart. An electrocardiogram showed inverted T waves indicative of pericarditis, and after the injury a loud diastolic murmur and a less loud systolic murmur were audible. Convalescence was slow and complicated by mild congestive heart failure. During the ensuing 6 months the congestion cleared, the heart size diminished, the T waves became upright, and he was discharged in February, 1945. Over subsequent years he has been followed by the Veterans Administration.

In general he has been well. Although he is limited by dyspnea and nonspecific chest pains on hurry-

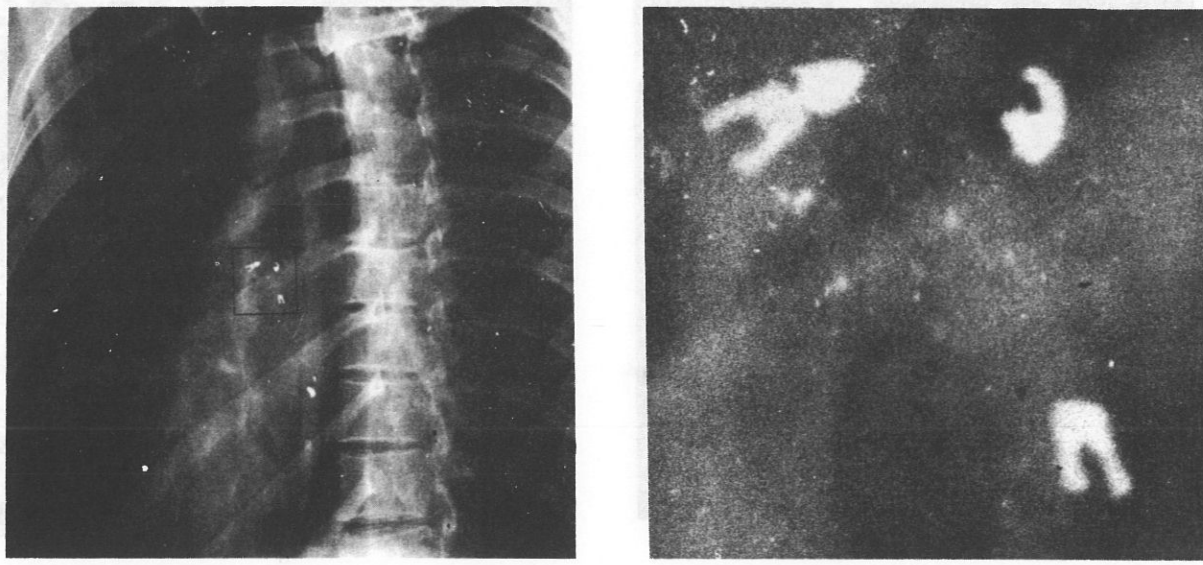
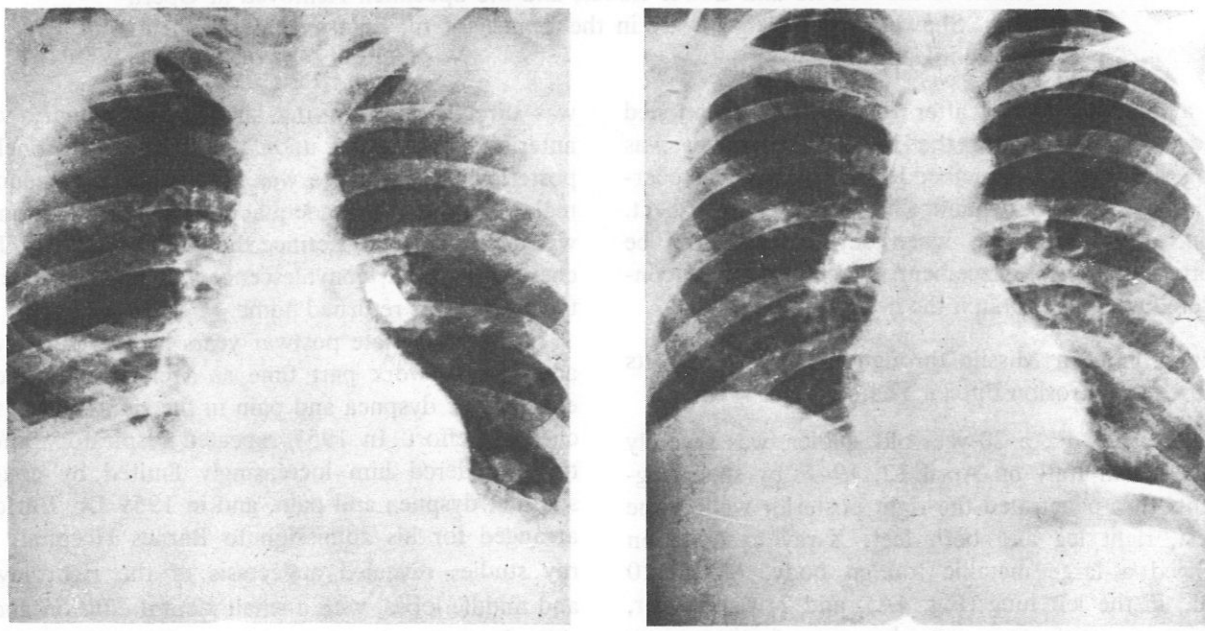


Figure 3. Views of the Chest, Showing Multiple Small U-Shaped Fragments in the Right Lung and Heart Wall, Thought to Be from a Shattered Zipper in 1936.



A B

Figure 4. Migration of a Shell Fragment from the Left to the Right Pulmonary Artery in 1944.

ing or on ascending hills, he is able to work part time as a furniture salesman. The heart remains slightly enlarged on x-ray study, with the foreign body visualized as before. The pattern of left ventricular hypertrophy has evolved in the electrocardiogram, but without evidence of "strain," and a loud diastolic murmur widely transmitted, though maximal to the left of the sternum, characteristic of aortic regurgitation, and also a less loud systolic murmur in the same area remain. The pulse pressure is wide, as it has been from the beginning, with a blood pressure of 120/30/0 and the collateral signs of free regurgitation.

This is the only case in the series in which valve injury occurred from a penetrating missile although a similar injury to the mitral valve was encountered

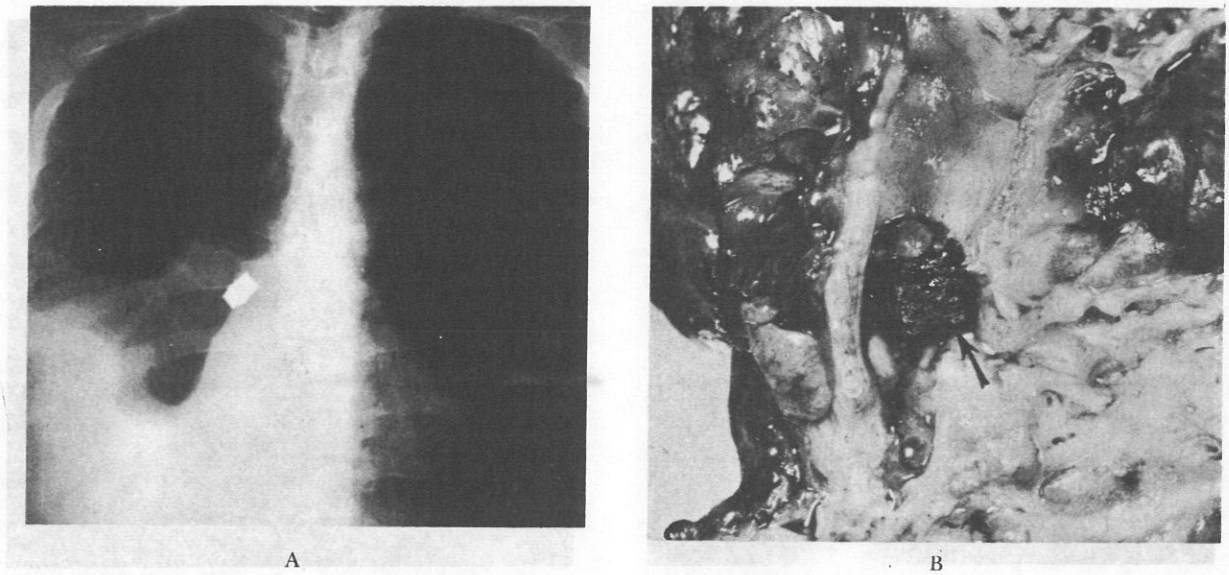


Figure 5. Film of the Chest Taken in 1959(A), Showing a Shift in the Position and Axis of the Foreign Body at the Hilus of the Lung, with Atelectasis and Consolidation of the Middle and Lower Lobes, and the Specimen Removed at Operation (B), Showing the Foreign Body in the Lumen of the Intermediate Bronchus of the Right Lung.

in a German soldier after the war (as mentioned above). In each case the invading fragment was long and linear, was embedded in the basal myocardium and moved dynamically with each heartbeat. Injuries of this type, when severe, can now be helped by valve replacement, which should be considered for this veteran if the need arises.

Migration of a Missile through the Heart and Its Subsequent Erosion Fifteen Years Later

Case 7. J. F., a 20-year-old soldier, was severely wounded in Italy on April 12, 1944, by shell fragments that penetrated the right posterior wall of the chest, right leg and both feet. X-ray examination showed a large metallic foreign body, 12 by 20 mm., in the left lung (Fig. 4A), and 2 weeks later, during a satisfactory convalescence, further x-ray studies confirmed the presence of the missile in the left side of the chest. On May 10 a thoracotomy and complete dissection of the left hilar region by Major Thomas H. Burford failed to reveal the foreign body. Recovery was uneventful, but postoperative x-ray study showed the foreign body now in the right hilus (Fig. 4B). On July 9 thoracotomy by Major Burford disclosed the foreign body impacted within the lumen of the right pulmonary artery. The pulmonary circulation seemed adequate. Complete dissection did not mobilize the artery sufficiently to attempt an arteriotomy, for the involved segment was directly beneath the superior pulmonary vein anteriorly and rested upon the right-stem bronchus posteriorly. Since there was no evidence of aneurysmal dilatation or inadequacy of the circulation it was decided not to sacrifice the pulmonary vein. The chest was closed, convalescence was uneventful, and the soldier was returned home.

In the immediate postwar years he was fairly well and able to work part time as a clerk. He experienced some dyspnea and pain in the right side of the chest on effort. In 1957 repeated respiratory infections rendered him increasingly limited by cough, sputum, dyspnea and pain, and in 1959 Dr. Burford arranged for his admission to Barnes Hospital. X-ray studies revealed atelectasis of the right lower and middle lobes, with a small pleural effusion and a shift downward in the position and axis of the foreign body (Fig. 5A). A mass of friable granulation tissue totally occluding the bronchus intermedius was seen on bronchoscopy. The patient did not improve on supportive measures, and the circumstances required a resection of the right lung, at which the 2 lower lobes were found to be atelectatic and the foreign body to obstruct totally the intermediate bronchus (Fig. 5B). Since operation the patient has returned to Pennsylvania, where he leads a quiet life limited by dyspnea and occasional pain in the right side of the chest.

In retrospect it seems likely that at the time of injury, the shell fragment entered a major thoracic vein, probably the superior vena cava, passed through the right chambers of the heart to the left pulmonary artery, and 2 weeks later during the manipulation of the 1st thoracotomy, shifted backward to its lodgment in the right pulmonary artery, where it remained for 15 years until its ultimate erosion into the adjacent bronchus. (This case is remarkable but not unique, since Barrett, in 1950, reported the shift of a bullet from the left pulmonary artery to the right and its successful removal 3 months later.)

The special circumstances and, in particular, the diligence with which 1 physician personally followed and treated this patient from the time of the first operation in Naples to the third thoracotomy in St. Louis warrants the designation "Burford's case."*

Summary and Conclusions

Recorded herewith are the after-histories of 40 soldiers of World War II with missiles in the heart. The record is complete in every case, and all the veterans have survived. The subsequent course and present status of this group are characterized by the following features:

Pericarditis was a common accompaniment of the injury, and an effusion of considerable degree (sometimes delayed) occurred in 25 percent of the cases.

Electrocardiograms were helpful in the acute phase and often called attention for the first time to the cardiac injury. In all but 2 cases the tracings have returned to a normal pattern.

The size of the heart on x-ray examination is now normal in all except the soldier with aortic-valve injury.

Elective removal of the missile was later attempted in 8 patients. It was successful in 3 but was abandoned in 5, in 2 of whom the foreign body could not now be found.

A delayed complication of major importance occurred in a soldier in whom the shell fragment lodged first in the left pulmonary artery, subsequently shifted to the right and fifteen years later eroded into and obstructed a bronchus, necessitating pneumonectomy (Burford's case).

The subsequent course of the remainder of these veterans has been benign except for the formidable psychologic strain of living with a missile in the heart. All are genuinely concerned about the missile, and 5 are totally incapacitated by an anxiety neurosis.

Subsequent migration, erosion or infection occurs infrequently once the foreign body is fixed in the myocardium. These complications have not appeared in the twenty years covered by this study.

Thus, it is evident that the actual risk from a retained fragment in the heart muscle is minimal, but the psychic trauma over the years is considerable and can be totally disabling. In the future it therefore seems desirable to remove the larger missiles and to assure the patient that henceforth his heart will be sound and its function unimpaired. The smaller foreign bodies, however, such as bird shot and zipper fragments, if silent, had best be left alone, since to find and retrieve them may be difficult or impossible and may do more harm than good.

(The references may be seen in the original article.)

* We are indebted to Dr. Thomas H. Burford, professor of surgery at Washington University School of Medicine and chief of the Division of Thoracic and Cardiovascular Surgery at Barnes Hospital, St. Louis, for the details and for the description of ensuing events.

AN EPIDEMIOLOGIC APPROACH TO MULTIPLE SCLEROSIS

John F. Kurtzke MD, Washington, D.C., Reprinted from Arch Neur 14(2):213-222, February 1966.

Multiple sclerosis (MS) is one of the most common primary diseases of the nervous system and one whose cause remains totally unknown. Detailed study of its anatomic and chemical pathology has not yet provided answers necessary for a basic understanding of the illness. With presently available methods, one major aspect of the disorder that has not been thoroughly evaluated is its epidemiology.

Epidemiology of a disease is the study of the distribution and course in relation to environmental and genetic factors with the goal of clarifying its cause, that is, the who, what, when, and where, in order to find out why. Epidemiology has only re-

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cently broken out of the rather narrow confines of acute infectious disease into the problems of chronic illness. The questions remain the same although the methods differ.

In considering the distribution of a disease, the basic axiom is that the risk of a given illness is the same throughout an entire population, unless there are features of the environment or host which alter that risk. For example, only in pregnant females do we consider eclampsia when convulsions and hypertension occur; we would not expect *Haemophilus influenzae* meningitis in a man of 40; and yellow fever is not indigenous to New England. The epidemiologic process, then, would employ the following steps: (1) determine the distribution of the disease in a given population; (2) if this distribution is markedly uneven, find why this is so; and (3) in order to accomplish this, note what factors can be correlated with this uneven distribution. One may then possibly have a hypothesis of cause to test in a different situation.

It has long been suspected that the distribution of MS really is uneven throughout the world. Early in this century, for a number of clinics the ratio of MS to other diseases seen was found to vary widely. Mortality data were generally in accord with this impression, but both these approaches left too many alternative explanations to be sure that this variation was a true reflection of differences in frequency in the general population.

The next step, therefore, was a study of incidence or prevalence rates. The incidence of a disease is the number of new cases developing in a unit time in a certain population. For example, three cases of MS beginning each year in a town of 50,000 people would provide an annual incidence rate of 6 per 100,000. In chronic disease, direct calculation of incidence is frequently unsatisfactory. The prevalence (more technically, point prevalence) is the rate derived from the total number of cases of a disease present at any one time in a population. If, when tested, the town cited were discovered to have 40 cases of MS among its citizens, the prevalence (rate) for MS at that time would be 80 per 100,000 population. Since prevalence equals incidence times duration, the latter could be calculated if the average duration were known.

In prevalence studies of uncommon diseases, one obviously does not go from door to door to examine all the inhabitants. Rather, all available medical sources are used to obtain a list of all potential cases of the disease, and then—with defined criteria—a certain number of these are accepted as cases of the illness. These cases are then matched with published population figures to obtain the prevalence rate. This, then, is not a true arithmetical ratio but a derived one, and one can but hope that almost all cases have come to attention in the study.

The tribulations and complexities of prevalence studies in MS have been pointed out best by Kurland, who pioneered these efforts in this country. For MS we have no laboratory proof but only clinical criteria of diagnosis. No published study has been verified by autopsy data. The case selection, then, is subject to bias when different examiners study different areas. There is also the question of missed cases, that is, those which should have been included in the original screening. A man has MS only when he is so labeled by his doctor; he is included in the survey only when the doctor lists him, directly or indirectly, as a case of the disease. Another problem is the duration of MS. The prevalence rate is higher the longer the duration of illness. Despite these difficulties, prevalence studies are really the only method of determining the distribution of MS.

Comparison of Prevalence Studies

In order to minimize these sources of variation, limits must be placed on prevalence studies that can be compared with one another. In addition to the usual requirements for a well-defined and properly conducted survey, the time of the work is important. Studies done before 1940 are excluded because these early prevalence rates were low, largely as a result of the duration of MS, which was near ten years early in this century, rather than the more than 20 years evident at present. Furthermore, in these studies only that class of case considered most likely to be MS is included. These are variously called "definite," "probable," or "certain" MS. The exclusion of "possible MS" cases lends much more uniformity to the diagnostic criteria among these surveys.

There are some 50 studies which can be assessed in this fashion. Most of these works encompassed small regions and may be considered "spot surveys." They originated in various parts of the world outside of South America and the Sino-Russian regions.

From these surveys we note that the rates in southern Canada and northern United States range from 30 to 60 per 100,000 population, and center at 45 per 100,000. In the southern United States most rates are near 10 per 100,000 with a 5 to 15

range. In the northern part of Europe, it is more clearly seen that the prevalence is within the range of 30 to 60 with a center at 45 per 100,000 population. In southern Europe the prevalence rate is about 10 per 100,000. In Australia too the rates are about 10 with a range of 5 to 15. In Asia and Africa the prevalence is near 1 per 100,000 with a 0 to 4 range.

TABLE 1. *Distribution of MS in Sweden* *

	Area	% Mean Prevalence
1.	Stockholm	84
1a.	Stockholmslän	80
2.	Upsala	232
3.	Södermanlands	87
4.	Östergötlands	105
5.	Jönköpings	128
6.	Kronobergs	124
7.	Kalmar	57
8.	Gotlands	16
9.	Blekinge	71
10.	Kristianstads	86
11.	Malmöhus	112
12.	Hallands	91
13.	Göteborgs-Bohus	88
14.	Älvsborgs	120
15.	Skaraborgs	148
16.	Värmlands	129
17.	Örebro	137
18.	Västmanlands	96
19.	Kopparbergs	94
20.	Gävleborgs	76
21.	Västernorrlands	49
22.	Jäm lands	87
23.	Västerbottens	145
24.	Norbottens	52
	Total MS = 1,306	100.00 = 21.256 mean prevalence

$\chi^2 = 151.27$ ($P = 0.01$ at χ^2 42.980)

* Summary of data for each county expressed as a percentage of the mean (national) prevalence rate.

Thus, the general distribution of MS may be described by three broad zones or bands. In the high frequency band (30 to 60 prevalence) lie northern United States, southern Canada, and Europe from Switzerland through Scandinavia. This zone is bordered on the south by a medium frequency band of 5 to 15 prevalence consisting of southern Europe and southern United States. Australia is also an area of medium prevalence. Low frequency areas (0 to 4 prevalence) comprise the rest of the surveyed lands, that is, Asia and Africa.

This distribution, therefore, does not show a correlation with latitude, except in the most general terms. Only in North America is there a suggestion of a linear relationship, and this is entirely due to one study of Washington, DC where the prevalence of MS, obtained from hospitalized patients only, lies between the high and medium prevalence bands. Correction for estimated number of nonhospitalized patients led the authors themselves to raise the prevalence from 21 to 27, and then its range fell within that of the high frequency band.

Large-Area Surveys

However, this division into three frequency bands does not add much to our knowledge of the disease. For one reason, the nature of the distribution outside the small survey areas is unknown. Prevalence studies in which an entire country was investigated by a single group at a single time are necessary in order to describe adequately the distribution of MS throughout these lands. In this context remote studies are acceptable, as they are not to be compared with one another in terms of absolute prevalence rates.

Nine surveys of large areas have been published. The countries concerned are Iceland, Northern Ireland, the northern part of Scotland, Norway, Sweden, Denmark, and Switzerland; all are within the high frequency band of Europe. In each study the cases of MS have been allocated by residence in the major administrative units of the country. With the hypothesis that there was no difference in the frequency of MS among these units of each country, the distributions for the separate studies were tested statistically by the X^2 contingency method.

TABLE 2. *Distribution of MS in Norway Rural Cases Only* *

	Area	% Mean Prevalence
1.	Østfold	85
2.	Akershus	126
3.	Hedmark	95
4.	Opland	147
5.	Buskerud	194
6.	Vestfold	145
7.	Telemark	178
8.	Aust-Agder	79
9.	Vest-Agder	149
10.	Rogaland	63
11.	Hordaland	9
12.	Sogn og Fjordane	23
13.	Møre og Romsdal	66
14.	Sør Trøndelag	182
15.	Nord Trøndelag	128
16.	Nordland	67
17.	Troms	42
18.	Finmark	18
	Total MS = 819	100.00 = 36.445 mean prevalence

$\chi^2 = 245.40$ ($P = 0.01$ at χ^2 33.409)

* Summary of data for each county expressed as percentage of the mean (national) prevalence rate.

In Iceland, surveyed by the Gudmundssons, no significant variation was found in the residence of MS cases within seven areas. There were only 67

cases in the study, too few for a definitive statement concerning the distribution. There was a suggestion, though, that the disease was less common in the south (P between 0.10 and 0.05).

TABLE 3. *Distribution of MS in Denmark* *

New Series—1950			Old Series—1933	
	% Mean Prevalence	Area	No. as in Reference 18	% Mean Prevalence
1.	69	Copenhagen area	XVIII	58
2.	97	Roskilde area	XVI	80
3.	79	Fredericksborg	XVII	44
4.	87	Holbaek	XIX	84
5	100	Sorø	XX	100
6.	98	Praestø	XV	44
7.	88	Bornholms	XIV	60
8.	91	Maribo	XIII	104
9.	122	Svendborg	XII	151
10.	128	Odense	IX	173
11.	135	Vejle	VIII	160
12.	142	Skanderborg	VII	111
13.	117	Århus	VI	122
14.	135	Randers	III	102
15.	95	Ålborg	I	84
16.	94	Hjørring	II	109
17.	132	Thisted	V	147
18.	134	Viborg	IV	169
19.	110	Ringkøbing	X	138
20.	108	Ribe		
21.	84	Haderslev		
22.	73	Åbenrå Sonderborg	XI	71
23.	61	Tonder		
	100.00 = 74.194 mean prevalence			100.00 = 45.0 mean prevalence
	2426 = Total MS = 689			
	$\chi^2 = 147.48$ ($P = 0.01$ at χ^2 40.289).			

* Summary of data for each county expressed as percentage of the mean (national) prevalence rates, separately for two series.

The report of MS in Northern Ireland by Allison and Millar covered 400 patients at onset and a total group of 700. Among these there was no significant variation by residence within eight countries. Here, there are a sufficient number of cases to conclude that the disease is equally distributed within these units. Much different, though, were the results in northern Scotland as reported by Sutherland. With only 127 cases divided among seven counties or ten sub-units, a highly significant deviation from the mean was found (P under 0.01). The northern two counties were high with prevalence rates of 79 and 114, while the mean was 55 per 100,000.

In Sweden, also, a very significant variation from a uniform distribution was found in the study of Sällström (P well under 0.01). High frequency counties were located in the southern lake region, mostly inland. There was one separate county in the north with a significantly high rate; in this area both the MS cases and the population were concentrated on the coast near Umeå. Other than this one, however, the high prevalence MS areas were contiguous with one another, thus forming a "focus"§ of MS. These areas demonstrated prevalence rates extending to 230% of the mean rate of 22 per 100,000 (Table 1).

TABLE 4. *Distribution of MS in Switzerland* *

New Series—1956			Old Series—1922	
	% Mean Prevalence	Area	No. as in Reference 12	% Mean Prevalence
a.	115	Zurich	19.	175
b.	108	Bern	3.	91
c.	100	Luzern	E.	58
d.	45	Uri	16.	0
e.	96	Schwyz	13.	38
f.	49	Unterwalden	9, 10.	43
g.	95	Glarus	6.	120
h.	125	Zug	20.	57
i.	65	Fribourg	4.	31
j.	106	Solothurn	D.	158
k.	206	Basel Stadt	A.	333
l.	136	Baselland	B.	142
m.	143	Schaffhausen	12.	89
n.	75	Appenzell	1, 2.	26
o.	81	St. Gallen	11.	56
p.	67	Graubünden	7.	53
q.	110	Aargau	C.	157
r.	97	Thurgau	15.	86
s.	41	Tessin	14.	32
t.	86	Waadt	18.	51
u.	37	Wallis	17.	14
v.	113	Neuenburg	8.	89
w.	67	Genf	5.	92
	100.0 = 51.417 mean prevalence			100.0 = 22.219
	$278.88 = \chi^2 = 385.23$			
	($P = 0.01$ at χ^2 40.289)			($P = 0.01$ at χ^2 42,980)

* Summary of data for each county expressed as percentage of the mean (national) prevalence rates, separately for two series.

This "focus" in Sweden actually seems to connect with the high frequency region of Norway, as delineated from a totally distinct study by Swank et al. Here the counties of high prevalence were all connected and were located largely to the east of the southern mountain ridges. This distribution in Norway is also significantly nonrandom (P under 0.01), and the prevalence rates extend to almost 200% of the mean of 36 per 100,000 (Table 2).

TABLE 5. *Selected Correlations by Prevalence Rate Ranks for Norway*

Distribution of MS vs			
Group Tested	No. of Subjects	r *	Significance
All physicians, 1948	2,645	+0.50	5% ‡
(same by χ^2a ranks)	2,645	+0.57	2% ‡, 1% §
Neurologists, 1948	26	+0.19	NS †
Ophthalmologists, 1948	42	+0.14	NS
Internists, 1948	101	+0.14	NS
Hospitals-infirmaries, 1946	207	−0.25	NS
General hospitals, 1948	71	+0.01	NS
Hospital-infirmary beds, 1946	15,280	−0.07	NS
Hospital-infirmary admissions, 1946	254,731	+0.34	NS

* Spearman rank-order correlation coefficient.
† Not significant (5% level).
‡ Probability less than 0.05, two-tailed (t) test.
§ Probability less than 0.05, one-tailed test.

† Details of the method are in reference 12, with further elaboration in the discussion following that paper.

‡ Data for Iceland, Northern Ireland, and northern Scotland, as well as more complete consideration of all these national studies, are in reference 12.

§ "Focus" is used in quotes to avoid the connotation of infection, which would certainly be premature at best.

Denmark and Switzerland are of special interest since each country was the subject of two separate studies, each covering different generations of patients.

In Denmark, Gram reported the distribution of almost 700 patients receiving disability compensation for MS from 1921 through 1933. There was a marked variation in prevalence with the areas of high frequency (rates up to 170% of the mean of 45 per 100,000) extending continuously across middle Jutland on to Fünen, the next island to the east (Table 3). This distribution was essentially the same as that recorded by Hyllested in a most intensive study. Here, with almost 2,500 patients alive in October 1949, a highly significant variation from the mean prevalence was found for the distribution of MS patients at birth, in childhood, before onset, and at onset. The high prevalence counties were essentially the same ones in all four of these periods, with rates ranging to some 150% of the mean prevalence (Table 3), and the concentration of cases was maximal in the childhood distribution. The rank-order correlation by prevalence rates of the counties between the two Danish studies was 0.87, indicating a highly significant association ($P=0.01$ for rank-order [r] of 0.53 in this test).

The early study of Switzerland covered the period from 1918 to 1922. In 861 cases, residence at onset showed a highly significant variation from the mean (P under 0.01), and again the high frequency counties formed a single "focus" in the northwestern part of the country. These cantons ranged to over 300% of the mean prevalence of 22 per 100,000 (Table 4). The survey by Georgi and Hall in 1956 also demonstrated a significantly nonrandom distribution (P well under 0.01), with prevalence rates to some 200% of the mean in this study of 2,600 cases. Here, too, the high prevalence areas were contiguous and in the northwestern part of Switzerland. The expansion of this "focus" from that of the first study is mostly due to the inclusion of Bern, which was just below the mean in the early work (Table 4). As with Denmark there was a very significant correlation between these two Swiss studies: rank-order correlation was 0.84 and 0.79 by two methods ($P=0.01$ at r of 0.50).

In summary then, with the exception of Northern Ireland, all the prevalence studies of entire countries with large numbers of MS cases revealed markedly uneven distributions of very high statistical significance within the individual country. The overall difference in prevalence rates between the highest and lowest counties for these countries was more than six to one (82.8 per 100,000 vs 12.7 per 100,000). That is, within these countries there were six-fold variations in the rates of MS from one part to another, a degree of variation which certainly seems of importance. Furthermore, the areas of high prevalence, with the exception of a single county in Sweden, were contiguous with one another in each country, thus forming single "foci" of MS. This, too, indicates that this is more than a statistical artifact and suggests an association with a similarly distributed environmental factor. Lastly, there is the finding of basically the same distribution of MS in separate surveys for each of two countries, Denmark and Switzerland, which encompassed different generations of patients. The degree of correlation for each country is striking, especially considering the uncertainties inherent in this type of study. Certainly, this is strong support for the reality of these observations.

TABLE 6. *Selected Correlations by Prevalence Rate Ranks for Sweden*

Group Tested	No. of Subjects	r *	Significance
Distribution of MS vs			
All physicians, 1933	2,629	+0.09	NS †
General hospitals, 1933	94	−0.58	1% ‡
General hospital beds, 1933	18,637	+0.14	NS
General hospital admissions, 1933	278,058	+0.05	NS

* Spearman rank-order correlation coefficient.
† Not significant (5% level).
‡ Probability less than 0.05, two-tailed (t) test.

Familial Cases and "Foci" of MS

Granting the existence and degree of these "foci" of MS in these countries, to what can this be attributed? Since these are relatively stable populations, the possibility of clusters of familial cases has to be considered. For Switzerland, Norway, and the early Danish study, the original papers provide no data on

TABLE 7. *Selected Correlations by Prevalence Rate Ranks for Denmark*

Group Tested	No. of Subjects	r *	Significance
Distribution of MS at onset (1940) vs			
All physicians, 1950	4,454	+0.29	NS †
Neurologists, 1950	64	+0.13	NS
Internists, 1950	207	+0.40	NS ‡, 5% §
(same, by χ^2a ranks)	207	+0.22	NS
Ophthalmologists, 1950	72	+0.31	NS
General hospitals, 1950	151	−0.38	NS ‡
Hospital beds, 1950	25,225	+0.17	NS
Settled doctors, 1940	2,253	+0.26	NS
"Younger doctors," 1940	1,079	+0.42	NS ‡, 5% §
(same, by χ^2a ranks)	1,079	+0.21	NS
All specialists, 1940	634	+0.35	NS
Hospital beds, 1940	23,596	+0.36	NS

* Spearman rank-order correlation coefficient.
† Not significant (5% level).
‡ Probability less than 0.05, two-tailed (t) test.
§ Probability less than 0.05, one-tailed test.

familial frequency. In the Swedish report there were under 2% of the cases which were familial. Excluding all these 19 cases could not alter the distribution. In the survey of northern Scotland, the familial cases had not been included but they showed the same focal distribution as did the cases within the study.

TABLE 8. *Selected Correlations by Prevalence Rate Ranks for Switzerland*

Distribution of MS vs (all 1956)			
Group Tested	No. of Subjects	r *	Significance
All physicians	4,809	+0.29	NS †
Physicians responding	3,685	+0.30	NS
Neurologists	85	+0.29	NS
Internists	720	+0.04	NS
Ophthalmologists	154	+0.52	2% ‡, 1% §
(same, by χ^2a ranks)	154	+0.26	NS
General hospitals	204	−0.64	1% ‡
General hospital beds	25,816	−0.24	NS

* Spearman rank-order correlation coefficient.
† Not significant (5% level).
‡ Less than 0.05, two-tailed (t) test.
§ Less than 0.05, one-tailed test.

In Hyllested's Danish work, there were 152 familial cases within the survey and another 218 excluded as dead or not in Denmark on prevalence day. The distribution for the 342 was not significantly different from the concentrations noted for the entire 2,500 MS cases, but the 152 included in the study did show a difference significant at the 1% level. This was caused by an even more striking concentration of these familial cases than expected from the entire MS series within the same high-frequency counties. Recalculation of the data for the total MS series after exclusion of all familial cases did not alter the significance or location of the contiguous areas of high frequency MS in Denmark. Therefore, the "foci" noted in these studies cannot be attributed to concentrations of familial cases of MS.

Medical Facilities and "Foci" of MS

The essential question to answer, though, in terms of these "foci" is their relationship to the distribution of medical facilities. Are these cases concentrated simply because their ultimate source—physicians and hospitals—is similarly concentrated? To answer this, all available medical facilities for these countries at the time of the surveys were evaluated in the same fashion as the MS cases, that is, calculation of prevalence rates and X^2 values by county.

In Norway there was no correlation|| of the distribution of MS with that of hospitals, hospital beds, or hospital admissions. This was the primary source of the MS cases. A weak correlation was present for the distribution of all physicians, but not for neurologists, internists, or ophthalmologists, singly or combined, whose group included the secondary source of MS cases (Table 5). In Sweden there was no correlation with the distribution of hospitals, hospital beds, or admissions, the primary source of MS cases. The distribution of physicians also showed no evidence of an association (Table 6).

For Denmark separate tests were done for both childhood and onset distributions of MS vs distributions of medical facilities in 1940 and 1950. In essence, none of the many aspects tested of doctors, specialists, or hospitals showed significant correlation with the MS cases (Table 7). In Switzerland also, there was no correlation with the distribution of these same groups of doctors or hospitals, nor was there an association with that of the physicians answering the survey questionnaire, the primary source of the MS cases (Table 8).

|| Correlation testing was done by the Spearman rank-order method.

Conclusion

It seems, therefore, that there are indeed real and highly significant concentrations of MS cases or "foci" of high prevalence within these countries of Scandinavia and Switzerland. This is not explicable by any bias in case-selection, is not attributable to clusters of familial cases, and is not a reflection of medical facilities available. This most strongly suggests that there is in these lands an exogenous factor necessarily associated with MS, which is unevenly distributed in like manner. Furthermore, a disease necessarily associated with an exogenous environmental factor may properly be defined as an acquired exogenous disease. Therefore, a search for the environmental factor(s) might finally provide a clue to the etiology of multiple sclerosis.

Summary

The epidemiology of multiple sclerosis (MS) is best delineated from prevalence studies of different populations. In this way the world-wide distribution of MS may be described within three frequency bands: (1) high frequency with prevalence rates of 45 per 100,000 and a range of 30 to 60, comprising northern United States, southern Canada, and Europe from Switzerland through Scandinavia; (2) medium frequency with prevalence of 10 per 100,000 and a range of 5 to 15, including southern United States, southern Europe, and Australia; and (3) low frequency with prevalence of 1 per 100,000 and a range of 0 to 4, for Asia and Africa.

Detailed delineation of the distribution of MS is obtained from prevalence studies of entire countries, of which there are nine, all from Europe. In the survey of Iceland, there were too few cases to define the distribution. In Northern Ireland there was an even distribution of MS. In all other countries (northern Scotland, Sweden, Norway, Denmark, Switzerland) there was in each instance a highly significant deviation from a random distribution of MS, of such a degree that the prevalence rates within these countries varied more than sixfold. The high prevalence areas of each country were almost all contiguous, thus forming single "foci" of MS within each country. Two of these lands, Denmark and Switzerland, each were the subject of separate prevalence studies done 17 and 34 years apart, respectively. Both demonstrated highly significant correlation between the old and new studies.

The location of these "foci" was not attributable to the presence of familial cases of MS in Sweden, Denmark, or northern Scotland; no data were available for Norway or Switzerland. Detailed consideration of medical facilities (doctors, specialists, hospitals) showed no correlation with these "foci" in Norway, Sweden, Denmark, or Switzerland.

It is concluded that, within these countries of the high frequency band of Europe, MS cases are distributed within clusters or "foci" of high prevalence. The presence of these "foci" indicates the concomitant presence of a similarly distributed exogenous factor necessarily associated with the disease. Identification of this factor may well provide a clue to the ultimate discovery of the etiology of multiple sclerosis, an illness which is considered, from the evidence presented here, to be an acquired exogenous disease.

(The references may be seen in the original article.)

Dr. Kurtzke is a Commander, Medical Corps, U.S. Naval Reserve.—Editor.

DENTAL SECTION

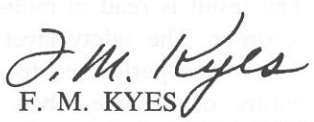
FIFTY-FOURTH ANNIVERSARY OF THE U.S. NAVAL DENTAL CORPS

On this Fifty-Fourth Anniversary of the U.S. Naval Dental Corps, I wish to commend and thank all of our personnel: dental officers, officers of the Medical Service Corps, dental technicians, and civilians who have contributed so much in promoting and improving the oral health of our sailors and marines. Especially gratifying is the outstanding performance of our personnel in combat areas.

Through your tireless efforts and dedicated service, you have enhanced the Navy's image in the eyes of the world and fostered an expanded dental care program which has permitted your Corps to reach new heights. For example, we are getting new equipment, civilian dental hygienists, civilian dental assistants, and Red Cross volunteers to augment our efforts. We have an effective preventive dentistry program for active duty personnel and a preventive program for young Navy and Marine Corps dependents. We are effectively conserving manpower with dockside programs which bring treatment nearer the patient source, and with limited prosthetic laboratories which send the cast but not the patient on costly, time-consuming trips.

Time Magazine says our Corps is the acknowledged leader in the control and prevention of dental caries among young adults, however, "it's slippery at the top." We cannot relax our efforts in resolving the caries problem and in the coming years we must redouble our efforts to improve periodontal programs. The establishment of our first specialty clinic in periodontics is one of a number of steps we have taken in this direction. As with dental caries, it is a problem of staggering proportions and we urgently need new ways and aggressive action to cope with it throughout the Navy.

Again, I thank you for your support and wish you true courses and billowing sails at sea and shore, at home and in your offices during the coming year.



F. M. KYES
Rear Admiral, DC, USN

AN EVALUATION OF THE POTENTIAL HAZARD OF CHROME-COBALT STEEL DENTURE MATERIAL TO EXPLOSIVE ORDNANCE DISPOSAL PERSONNEL DENTURE WEARERS

LCDR J. R. Cushing, Jr. DC USN, the Dental Officer, U.S. Naval Propellant Plant, Indian Head, Maryland.

For many years the Dental profession has been using modern steel alloys in place of gold for partial denture construction. Gold has still had a wide application in the Navy due to technical and cost factors in shipboard laboratories. Recently, a new prosthetic program was put into effect in the Navy. Under this program, independent duty dental officers can provide prosthetic care by using a central laboratory. These central laboratories use a chrome-cobalt alloy. There will now be more dentures fabricated in the Navy using this material. This raised a question relative to Explosive Ordnance Disposal personnel. Namely, what is the magnetic signature of a chrome-cobalt steel alloy denture?

This magnetic signature, briefly, is that influence an object has upon its surroundings; in other words how the object affects the earth's magnetic field, the field of other objects, and how its own magnetic field affects other fields. This does not appear to have a relation to dentistry until we realize that there are many Explosive Ordnance Disposal men who wear dentures. These men may be called upon to deactivate mines that are detonated by magnetic influence. Thus, if their steel alloy denture has a significant magnetic signature, it might detonate the mine. Some divers need their dentures in order to hold their mouthpiece properly. Therefore, it is not always practicable to remove the denture when diving.

EOD divers, where concerned with magnetic mines, use special equipment. It is usually nonmagnetic, or nonferrous material, so as to have as low a magnetic signature as possible. The magnetic signature of this equipment and the diver himself is measured by use of a magnetometer. This is a device for reading the magnetic flux density of an object placed near the sending head. It will also read eddy-currents of nonmagnetic or nonferrous objects. The result is read in milli-gauss units on a meter or recorder. The safety level is 0.1 milli-gauss or less. A test was performed to evaluate the magnetic signature of chrome-cobalt steel alloy dentures. Patients with such dentures, were measured by a magnetometer. As a control, patients with similar dentures of gold were measured. Also, patients with a gold bridge, a full maxillary and mandibular denture and a normal dentition were measured. The subject stood in front of the magnetometer with all unnecessary metallic objects removed (glasses, watches, etc.). His mouth was approximately four and one half inches from the sending head. He then turned his head from side to side for a reading. This was the first reading on each subject with dentures in place, the second reading was taken with dentures removed, and the third was taken with the subject holding the dentures out of the mouth in front of the sending unit. There was no significant difference in the three readings. A chart shows the highest of the three readings for the various subjects

CHROME-COBALT STEEL ALLOY DENTURES

PT #1 Partial Lower	0.03
PT #2 Partial Lower	0.02
PT #3 Partial Upper	0.01
PT #4 Partial Upper	0.01
PT #5 Partial Lower	0.01
PT #6 Partial Upper and Partial Lower	0.02

GOLD ALLOY PARTIAL DENTURES

PT A Partial Upper	0.00
PT B Partial Lower	0.00
PT C Partial Upper	0.00–0.01
PT D Partial Lower	0.00
PT E Partial Lower	0.00

FULL DENTURE PATIENT

Full Upper and Full Lower Denture	0.00

NORMAL DENTITION PATIENT

Normal dentition (28 teeth) (Amalgam restorations present)	0.01

GOLD FIXED BRIDGE PATIENT

Four (4) Units Upper and Four (4) Units Lower	0.01

The results of this test clearly show that all readings are well below the 0.1 milli-gauss limit. Actually, even though the chrome-cobalt steel alloy dentures showed a higher reading, there is no danger of the dentures themselves causing a detonation. It should be remembered, however, that they do have

a greater magnetic signature than other dental materials. Consequently, when the total magnetic signature of a diver and equipment is considered, there is a possibility of an additive effect caused by the denture. It is felt that there is no danger caused by these dentures themselves, but when worn by a diver their presence should be considered for complete safety.

One other point of significance is that the actual working distance of a diver's mouth to the core of the detonating unit of a magnetic influence mine would be approximately ten inches. This is double the distance at which the test was performed. Increasing the distance will lower the effect of the object. Thus, dentures would have less of an effect in actual working practice than in the test. Therefore, the potential hazard would be decreased. However, it may be argued that if the diver got closer to the detonating unit the potential hazard would be increased. This is true, but under no circumstances could the diver get closer than about six inches from the detonating unit which is located inside the mine. Even with diving gear (mouthpiece, mask, etc.) removed and the diver "kissing" the mine, he would be at least six inches distance from the detonating unit. Consequently, our original statement based on a ten inch working distance would remain valid.

In conclusion, these tests showed that the chrome-cobalt steel alloy denture material definitely has a magnetic signature but it is below the danger limit in relation to magnetic influence mines. For complete safety, its presence in an EOD diver's mouth should be known to guard against a possible additive effect.

Grateful appreciation is expressed to the Explosive Ordnance Disposal Facility, and the Explosive Ordnance Disposal School for their cooperation in conducting this study. Particular thanks are in order for Mr. Frederick H. Michels of the Test and Evaluation Department of EODF without whom this test could not have been performed.

Editor's comment: The author is commended for his outstanding professional responsibility and initiative demonstrated in this report.

The opinions and assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

PERSONNEL AND PROFESSIONAL NOTES

PROFESSIONAL MEETINGS. Navy Dental Corps Officers of Naval Station, Treasure Island, San Francisco, California, hosted a joint meeting of the San Francisco and Alameda County Dental Societies at Treasure Island on 16 May 1966.

Table clinics and demonstrations were presented in the Dental Department during the afternoon. Following these the meeting continued at the Fleet Admiral Nimitz Club with presentations by Dr. William H. Hanford, Jr. and Dr. Rex Ingraham.

CAPT OSTROM ADDRESSES DENTAL TECHNICIAN GRADUATES. Naval Dental School, NNMC, Bethesda, Md. Jun 29—On June 17, 31 dental technicians graduated from advanced and specialized courses at the U.S. Naval Dental School. The graduation address was delivered in the Main Auditorium, NNMC, by Capt C. A. Ostrom, DC USN, Head of the Professional Branch, Dental Division, BUMED, who spoke on "Strength, Quality, and Passion—or the Facts of Life."

DTC J. N. Stutz was honor man in the Advanced General class and was also the winner of the Thomas Andrew Christensen Award, which is awarded from time to time to a graduate of an enlisted course in recognition of his loyalty and devotion to duty in the U.S. Navy.

DT1 Ernest R. Schulthess was honor man in the Advanced Prosthetic class.

TRAINING PROGRAM FOR DENTAL RESERVE COMPANIES. On 18 and 19 April 1966, the Dental Division, Submarine Medical Research Laboratory, Submarine Medical Center, Groton, Connecticut, provided an active duty for training program for Dental Reserve Companies 1–1 and 1–2 (Boston).

Formal presentations were as follows:

"Man-in-the-Sea"—LT R. T. Larsen MC USN
"Hearing Conservation"—C. K. Meyers
"Dental Research at SMRL"—CDR W. R. Shiller DC USN
"Submarine Force Dental Support"—CAPT G. O. Stead DC USN
"Stannous Fluoride Studies at SMRL"—CAPT F. P. Scola DC USN

"Psychological Aspects of Submarine Service"—CDR H. B. Molish MSC USN

"Submarine Atmosphere Control"—LCDR C. H. Darby MC USN

In addition, tours of the Base facilities were conducted.

U. S. NAVAL DENTAL CORPS CONTINUING EDUCATION PROGRAM. In expanding its program of training opportunities for dental officers, the U. S. Naval Dental Corps offered a new series of Continuing Education Courses during the last half of Fiscal Year 1966 in the Eleventh Naval District. It is planned to continue the series of courses in accordance with the following schedule:

Course	Dates
Periodontics	—Sept 12-16, 1966
Fixed Partial Dentures	—Oct 10-14, 1966
Preventive Dentistry	—Nov 28-Dec 2, 1966
Roentgenology	—Jan 16-19, 1967
Removable Partial Dentures	—Feb 13-17, 1967
Operative Dentistry	—Mar 13-17, 1967
Oral Surgery	—Apr 10-14, 1967
Complete Dentures	—May 15-19, 1967
Endodontics	—Jun 5- 7, 1967

Quotas are assigned and applications are processed by Commandant, Eleventh Naval District in accordance with current directives.

LEEWARD PROSTHETIC STUDY GROUP ORGANIZED. On 5 April 1966 the Leeward Prosthetic Study Group was organized to better acquaint its members with the basic problems and principles involved in removable and fixed dental prosthesis. The group is comprised of members from the Navy, Army, Air Force, and Civilian dental population. CAPT J. B. Stoll DC USN, Naval Dental Clinic, Pearl Harbor and Colonel V. Wood, USA, Tripler Army Hospital, Hawaii are consultants to the group. Both are Diplomates of the American Board of Prosthodontics. LCDR W. D. Loo DC USN, Naval Air Station, Barber's Point, Hawaii initiated the group and is acting moderator and chairman. Other members from the Naval Dental Corps are: LCDR P. Hatrel DC USN, FMFPAC, Camp Smith, LCDR H. E. Semler DC USN, COMSERVPAC Dental Officer, LT P. R. Cunningham DC USN and LT D. S. Prock DC USN, Naval Air Station, Barber's Point, Hawaii.

DENTAL OFFICER PRESENTATIONS. Three naval dental officers attended the Academy of Denture Prosthetics meeting as invited guests, in Louisville, Kentucky on 15–20 May 1966. CAPT Victor J. Niiranen, DC USN, Assistant Chief, Dental Division, BuMed participated in a Workshop on Principles, Concepts and Practices. CDR Edward P. Klecinic, DC USN, and CDR Robert J. Leupold, DC USN of the Prosthodontics Department, U.S. Naval Dental School, presented table clinics, respectively titled Crown Reconstruction of Clasp Bearing Teeth, and Restoration of Function to a Bone Grafted Edentulous Ridge with a Partial Denture.

CAPT Victor J. Niiranen, DC USN, Assistant Chief, Dental Division, Bureau of Medicine and Surgery, participated in the Medical Education for the National Defense Program at Tufts School of Medicine and Dentistry on 12–14 May 1966. This program was in conjunction with a Conference on National Disaster Preparedness, sponsored by the Division of Health Mobilization, U.S. Public Health Service. In a realistic simulated disaster, 250 medical and dental students divided into ten teams were rotated through administration, triage, maxillofacial injury, soft tissue wound, abdominal wound, chest wound, shock, resuscitation, burn and fracture management of approximately 200 civil emergencies at the Boston City Hospital.

CDR C. R. Jackson, DC USN, and CDR J. D. Nelson, DC USN, Puget Sound Naval Shipyard, presented a table clinic on Dowel Abutment Crowns at the 1966 Scientific Session of Washington State Dental Association on 11 May 1966.

NAVAL DENTAL SCHOOL HONOR WINNERS. Naval Dental School, NNMC, Bethesda, Md. Jun 24—LCDR Milton R. Wirthlin, Jr. received both the Commanding Officer's Award for Excellence in Operative Dentistry and the Naval Dental School Award for Achievement in Research Methods at graduation ceremonies at the Naval Dental School on June 24. LCDR James H. Charles, Jr., who is specializing in oral surgery, was commended as the top scholar in the class of 28 officers.

The operative award has been presented each year since 1959 to the officer who develops the skills of the general practitioner to the highest possible point. The Research award, given for the first time, recognizes the highest achievement in applying research methods to the conduct of a scientific study, the winner being selected from the entire class.

Dr. Wirthlin, his wife, Joan, and their four children now reside at 4012 Byrd Road, Kensington, Maryland, but will leave the area soon for San Francisco. Dr. Wirthlin has been selected to attend a long graduate course in periodontics at the University of California, where he received his D.D.S. degree.

Dr. Charles, who attained an average of 96.24 in the 10-month oral surgery course, lives at 5370 Pooks Hill Road, Bethesda, with his wife, Eleanor, and their five children. A native of Chicago, he enlisted in the Navy immediately after finishing his high school education and served as a dental technician for 5 years before enrolling at Emory University School of Dentistry in Atlanta, where he received his D.D.S. degree. The Charles family will soon move to Portsmouth, where Dr. Charles will begin a Residency in Oral Surgery at the U.S. Naval Hospital.

NAVY CAPTAIN AWARDED ARMY MEDAL. Naval Dental School, NNMC, Bethesda, Md. Jun 28 —CAPT Henry H. Scofield, who heads the oral pathology division of the Naval Dental School, in Bethesda, has been awarded the Army Commendation for exceptionally meritorious service during his recent 2-year tour of duty as chief of the dental and oral pathology division of the Armed Forces Institute of Oral Pathology. A graduate of Loyola University of Chicago and Georgetown University, CAPT Scofield is a director of the American Board of Oral Pathology. He was President of the American Academy of Oral Pathology in 1965.

NURSE CORPS SECTION

DEPUTY DIRECTOR NURSE CORPS RETIRES

On 31 May 1966, Vice Admiral Robert B. Brown MC USN delivered the Surgeon General's Certificate of Merit and retirement orders to Captain Dorothy P. Monahan, Deputy Director, Navy Nurse Corps. Captain Monahan completed 30 years of distinguished service in the Navy. Her career in the Nurse Corps commenced at the U.S. Naval Hospital, Philadelphia, Pennsylvania in 1936. She served at numerous naval activities in and outside of the United States. She was Chief of Nursing Service at naval hospitals in Guam; Yokosuka, Japan; Corona, California; and Oakland, California. Captain Monahan's future plans include travel and residence in the Washington, D.C. area.

LCDR Phyllis Elsass, NC USN recently received a M.S. degree in Nursing at the University of Colorado Medical Center. The title of her thesis is "A Study to Identify Experiences which Influence Retention of Navy Nurse Corps Officers."

LT Frances L. Crumpton, NC USN delivered a speech at the National Student Nurses' Association Convention in San Francisco, June 9–13, 1966. The title of her paper was "Service in Crisis." LT Crumpton recently returned from duty in Saigon, Viet Nam.

Her presentation included such topics as: the Mass Casualty Program carried out at the U.S. Naval Hospital, Saigon, the various types of injuries and diseases that she observed and cared for, the People to People Program, the Special Marine Project (Operation Cleft Lip for Vietnamese Children) and the specific duties that she performed as a Nurse Corps officer. LT Crumpton also informed the audience about the contribution made by the U.S.S. REPOSE and described the facilities and capabilities of the ship and its staff.

PREVENTIVE MEDICINE SECTION

POST EXPOSURE ANTIMALARIAL CHEMOPROPHYLAXIS

Malaria is a disease of considerable importance at the present time due to the deployment of troops in Southeast Asia.

All troops returning from a tour of duty are to be placed on an 8-week course of chloroquine-primaquine as post exposure antimalarial prophylaxis.

Recently, a representative sample of health records of men returning from Viet Nam were reviewed. This review did not reveal even one single

case with a substantiated record of a completed 8-week course of chloroquine-primaquine. There were a very few substantiated records of a completed 6-week course.

It is very important that all returnees from malarious areas receive their prophylaxis for 8 weeks and that this fact be recorded in the Health Record.—PrevMedDiv.

NUCLEAR-BIOLOGICAL CHEMICAL WARFARE MEDICAL DEFENSE

Attention of all medical department personnel is invited to the two new instructions in the NBC warfare medical defense area.

1. BUMED Instruction 3440.2B of 3 May 1966, Subj: "Nuclear Biological Chemical (NBC) Defense Material under the cognizance of BUMED at continental and overseas shore stations," outlines action procedures concerning on-hand NBC defense material programs. This instruction requires that all NBC defense materials, whether on hand or in inventory, be examined.

2. BUMED Instruction 6710.50A of 13 April 1966, Subj: "Medical Material Program for Defense against Biological and Chemical Agents, Phases I and II," is a combined instruction covering both Phase I and Phase II of the Biological Warfare-Chemical Warfare Medical Defense Program. The important change is the addition of the new drug 2-PAM-Cl, an oxime. Special training will be necessary for all medical department personnel in its use.

If additional information is needed, correspondence should be addressed to BUMED (Attention: Code 723).—NBC Medical Defense Section, PrevMedDiv.

WARNING!

This Week in Public Health, Mass Dept of Publ Hlth 15(19):185.

The Massachusetts Department of Public Health has issued a warning to homeowners and gardeners not to attach a household water system by hose to any tank or container filled with toxic fluid. The use of hose-operated sprayers for applying weed killers, fertilizers and similar products to gardens and lawns is dangerous. The toxic chemicals may be drawn through the hose by back-siphonage and enter the water pipes within the house. The safest method of applying these products is by using a portable tank and sprayer. After the spraying is completed, the operator should clean the equipment and store it in a safe place, then immediately wash all his exposed skin with soap and water.—Sanitation Section, PrevMedDiv.

DIPHTHERIA

Morb & Mort Wkly Rpt 15(20): 171, 21 May 1966.

Following the identification, between 22 Nov 1965 and 7 Feb 1966, of 2 cases and 2 carriers of diphtheria among Indians living on the Northern Cheyenne Indian Reservation in Montana, an investigation uncovered an additional 6 carriers. Nine of the 10 individuals affected were children, all of whom had received at least 2 diphtheria immunizations in the past. The strains involved were *Corynebacterium diphtheriae* intermedius and mitis. Of the 10 strains, 7 were toxigenic, 5 of these being from carriers.

The first case on 22 Nov 1965, was in a 5-year-old Indian boy who complained of a sore throat and was noted to have a non-fibrinous membrane on both tonsils. A throat culture taken at that time yielded a toxigenic *C. diphtheriae,* intermedius. The child had a mild illness which responded quickly to penicillin therapy and 2 subsequent cultures, from material obtained on 2 and 10 Dec were negative. Two of 14 immediate contacts of this case were found to be harboring non-toxigenic *C. diphtheriae* mitis. Both carriers were treated with procaine penicillin and following treatment cultures were negative.

On 7 Feb 1966, swabs from a 7-year-old Indian girl complaining of a sore throat yielded a culture of toxigenic *C. diphtheriae* intermedius. She was treated with CR Bicillin, after which cultures were negative for *C. diphtheriae.*

Epidemiological investigation failed to establish any connection between this girl and the earlier case. However, investigation of the girl's immediate contacts identified 5 other individuals who were harboring toxigenic *C. diphtheriae* intermedius. All were treated with CR Bicillin and all gave negative results from subsequent cultures. One other person was found to have a non-toxigenic strain of *C. diphtheriae* mitis and this individual refused treatment.

Symptoms varied among those classified as carriers; 2 of 7 individuals harboring toxigenic organisms were mildly ill, while 5 were asymptomatic. One person from whom a non-toxigenic organism was recovered complained of a sore throat at the time the swab was obtained for culture.

In order to determine the prevalence of *C. diphtheriae* in the communities of the Reservation, 200 throat cultures were obtained from children attending one elementary school, prior to their receiving immunizations during a program planned for 10–14 Mar 1966. There were positive isolates of *C. diphtheriae* from 14 of the 200 children; of these, 7 strains were intermedius type and toxigenic while 7 strains were mitis type and non-toxigenic.

The mass immunization program was conducted in the 4 major communities situated in the Northern Cheyenne Indian Reservation. Individuals who were unable to come to one of the clinics were either transported to the clinic or immunized in their homes. In this way more than 2,200 of the 2,800 residents of the Reservation received booster immunizations against diphtheria, tetanus and, if indicated, pertussis.

After this program, a general survey was conducted to ascertain the immunization levels of the residents of the Reservation. Results indicated that the level was not sufficiently high and a second campaign was conducted in an effort to reach those not adequately immunized. A later follow-up survey revealed that the current immunization levels of the residents of the Northern Cheyenne Reservation are sufficiently high to prevent outbreaks of clinical diphtheria for some time to come.

MYCOPLASMA PNEUMONIA INFECTIONS IN UK CITIZENS

Miller, C. H., ONR, London, No. 20–4, pp. 51 (18 Apr 1966).

A paper describing an epidemic of *M. pneumoniae* infection was presented at a meeting of the Royal Society of Medicine, London. The clinical description emphasised the severity of the complaint of general malaise, all out of proportion to the apparent objective illness, and, in general, it was not unlike the clinical picture reported from US studies. A total of 113 patients, 80% from the practice of a rural general practitioner, and the remainder from a hospitalized population suffering from acute respiratory disease, were included in the study. Isolation of the organism was not attempted, but serological studies confirmed the diagnosis. The criteria for recent *M. pneumoniae* infection were: (1) a 4-fold or greater rise in successive complement fixation (CF) titers: or (2) a single CF titer of $\frac{1}{64}$ with an accompanying high (unspecified) cold agglutinin titer. A *probable* recent infection would be tabulated on the basis of a single *M. pneumoniae* CF titer of $\frac{1}{64}$ or a 4-fold or greater fall in titer over 6–9 months.

The author reported a correlation between positive *M. pneumoniae* serology and a direct positive Coombs test and that reticulocyte counts were significantly elevated among patients with *M. pneumoniae* infection. Twenty-nine percent of patients with these infections revealed various mucocutaneous lesions, whereas only 13% of patients with other infections exhibited them (Herpes simplex lesions and measles excluded).

Much progress has been made in recent years. The total percentage of laboratory-diagnosed respiratory disease has increased since the diagnostic battery has included tests for *M. pneumoniae*. Several investigators have isolated different *Mycoplasma* from human tumors, especially leukemia, and other human diseases, but much caution is indicated in assigning causal relationships. With competent investigators of many laboratories working on this problem, the real dangers to man will ultimately be determined and defeated.

A 10-YEAR PLAN FOR SMALLPOX ERADICATION

WHO Press Release SEAR 813 of 16 May 1966.

The Nineteenth World Health Assembly in Geneva in May 1966 unanimously approved a worldwide smallpox eradication program outlined in a 10-year plan starting in 1967. In the first year, 220 million people are expected to be vaccinated.

Smallpox is directly transmitted from man-to-man, there are no animal reservoirs or vectors and the disease is quickly detected. The victim of the disease transmits the virus for only about 2 weeks and is immune against further attacks.

Eradication can be carried out in a simple and straight-forward manner by vaccinating the population until transmission is interrupted. In a highly endemic area this means vaccination of almost 100% of the population.

In 1958, the World Health Assembly underlined the urgency and desirability of a global program for smallpox eradication. In 1959, when the WHO program was initiated, 81,444 cases of the disease were reported. Cases reached a maximum of 99,599 in 1963 but have declined since then to half that number, partly because of the success of control measures and partly because of the natural cycle of smallpox incidence which grows and wanes.

Where Smallpox Lives

Endemic areas now include:

Six countries in Asia: India, Burma, Indonesia, Pakistan, Afghanistan, Nepal.

Essentially all of Africa, south of the Sahara.

In South America: Brazil, Peru and Colombia.

Transmission of the disease from these countries to the rest of the world remains a problem and imported cases continue to be reported to WHO each year from all parts of the world.

Facts and Figures

The Vaccine: Large amounts of freeze-dried vaccine, which remains stable even in the tropics. It must conform to the WHO requirements, which were revised in 1965. Local production, donation through WHO and contribution to countries on a bilateral basis will be the main sources of supply.

Other supplies needed: Transport, jet injectors, camping equipment, vaccine kits.

The cost: $0.10 per vaccination. About 30% of the general cost will have to come from outside sources (international assistance and bilateral aid programs). During the 10-year program 1,790 million vaccinations will be carried out, covering the entire population of endemic countries. The cost is estimated at $180 million of which international assistance, including that from WHO, would be about $48.5 million.

Countries without smallpox pay a high cost for remaining free from the disease through their own vaccination programs. Czechoslovakia spends more than $1 million a year in maintenance vaccination ($0.07 per person) and the U.S. $20 million annually ($0.11 per person). The U.K. has estimated the average cost of vaccination in a normal year at $0.65 million ($0.01 per person) but when small outbreaks occurred in 1961 and 1962 additional expenditure ran to $3.8 million.

The chances of success: It is clear from the results of successful programs in Central and South America, Southeast Asia, the Middle East and North Africa that intensified systematic vaccination, using potent vaccine, can rapidly eradicate the disease.

The urgency of a global well-coordinated eradication effort is emphasized because if it is delayed or prolonged there will be a further increase in cost due to the greater number of people to be vaccinated.

The World Health Assembly urged all countries concerned to begin the work as soon as possible and requested all member states and multilateral and bilateral agencies to provide adequate material support for the realization of the program.

WHO was requested to provide technical assistance, supplies, equipment and services.

HEPATITIS SURVEILLANCE SUMMARY

DHEW PHS, Morb & Mort Wkly Rpt, 15(2):16, week ending 15 Jan 1966.

The total cases and the reported incidence of viral hepatitis in the United States in the first 2 quarters of the epidemiological year 1965–66 are the lowest reported since 1959–60. Hepatitis morbidity data are summarized in terms of an "epidemiological year," which runs from the 27th week of each year through the 26th week of the succeeding year.

There were 7,361 cases of viral hepatitis reported in the U.S. during the summer quarter and 8,150 cases reported during the fall quarter of the epidemiological year 1965–66.

TABLE 1

A. Number of Reported Cases of Viral Hepatitis Per Quarter

Epidemiological year	Summer quarter	Fall quarter	Winter quarter	Spring quarter	Total year
1958-59	3,403	4,028	7,169	4,902	19,502
1959-60	4,700	6,026	9,793	9,917	30,436
1960-61	8,940	12,403	23,096	19,898	65,267
1961-62	14,229	15,580	17,995	13,533	61,337
1962-63	10,272	11,330	13,848	9,864	45,314
1963-64	8,969	10,250	12,118	9,320	40,657
1964-65	7,581	8,597	10,311	7,876	34,365
1965-66	7,361	8,150	—	—	—

B. Reported Cases of Viral Hepatitis Per 100,000 Population Per Quarter

1958-59	2.0	2.3	4.0	2.8	11.1
1959-60	2.7	3.4	5.5	5.5	17.1
1960-61	5.0	6.9	12.8	11.1	35.8
1961-62	7.9	8.7	9.8	7.4	33.8
1962-63	5.6	6.2	7.4	5.3	24.5
1963-64	4.8	5.4	6.4	4.9	21.6
1964-65	4.0	4.5	5.3	4.2	18.0
1965-66	3.8	4.2	—	—	—

MENTAL HEALTH CENTERS

DHEW, Public Health Service Release, HEW–27 (13 Apr 1966).

The first of more than 40 new comprehensive community mental health centers planned for New York City has been awarded a $1,350,000 Federal grant for construction, to share the cost of adding a 14-story mental health facility to Metropolitan Hospital.

The center will serve a population of about 200,000 New Yorkers in a crowded and low-income area that is a pocket of the city's highest crime and

delinquency, of drug addiction, unemployment, and substandard housing.

One of the new services will be mental health "battalion aid stations" to operate in the hospital district's congested neighborhoods, where professional personnel from the center will render "front line" services.

Special programs will also serve children, adolescents, and narcotic addicts. These will be among Metropolitan's full range of community mental health services that represent the nation's new attack on mental and emotional illness and the promotion of mental health.

The Metropolitan Mental Health Center will also feature a rapid turnover unit, with follow-up and home visit care, as well as day and night care programs. A walk-in clinic and emergency service will be staffed with three shifts of professional personnel as well as aides. For the inpatient service, the center will have space for 200 psychiatric beds.

The facility is affiliated with the New York Medical College Department of Psychiatry, which will be responsible for service as well as for training of personnel and research.

The total cost of the new structure is $11,590,000. City and State funds are to cover $8,355,000 of the cost.

The mental health centers for New York City are among a total of 112 projected in a State plan for centers throughout the State.

THE STINGING SCORPION

Science News Letter, 89(9):142 (26 Feb 1966).

A fierce scorpion can look its foe in the eye while it flips its back and stings that enemy with a curved stinger.

The poison injected from the sharp hook can inflict a wound severe enough to quell the struggles of a spider or insect, or it can kill the adversary. Even larger animals have succumbed to this poisonous creature, and many human deaths have been attributed to the scorpion.

These creatures belong to the largest group of animals without backbones, or invertebrates, and are of phylum Arthropoda, which means jointed feet. Scorpions are relatives of spiders, ticks and mites, and all are in the Arachnida class.

Scorpions vary in size from the shining black 8-inch species that inhabit the tropical jungles to the thin pale, 1-inch fellows that prefer to live in sandy or desert areas. They all have the same basic body shape—8 legs, 2 lobster-like pincher claws, and a jointed tail that flicks up over their backs when they are angry or alarmed.

About 400 species are known in the tropical and temperate zones of the world, many of which are found in southern Europe and northern Africa.

Of the 35 species inhabiting the United States, most are in the West and Southwest.

DID YOU KNOW?

That since measles vaccine was licensed in 1963, approximately 12 million doses have been given in the United States, and the number of cases of measles reported has dropped from 385,000 in 1963 to 266,000 in 1965?

It is estimated that only 1/10 of all cases of measles are reported. To protect preschool children against measles, the U.S. Public Health Service has contracted to buy at least 1½ million doses of vaccine in 1967, at a cost, including gamma globulin to minimize reactions, of 68¢ a dose. This purchase will help State and local health departments eradicate measles, one of the most serious and widespread childhood diseases. (1)

That 72 poliomyelitis cases were reported in 1965 to the Poliomyelitis Surveillance Unit?

Of these cases, 61 were paralytic cases, the lowest yet to be reported. Individual surveillance case records, consisting of an initial report and a 60-day follow-up have been submitted to the Poliomyelitis Surveillance Unit, Communicable Disease Center, Atlanta, Georgia, since 1958. (2)

That 482 cases, with 61 fatalities, of plague have been reported from Peru from January through April 1966?

Two hundred sixty-one cases were reported from Ayabaca Province, 135 in Huancabamba Province and 43 in Morropon Province. Since mid-February, 43 cases have occurred in the Provinces of Perreñafe and Lambayeque, Lambayeque Department, where the last outbreak was reported in 1958. (3)

That syphilis in Upstate New York has declined by 20.9%, from 3,368 in 1964 to 2,665 in 1965?

Gonorrhea cases, however, rose by 21.9%, from 5,852 in 1964 to 7,133 in 1965. (4)

That a medical program is being developed by the Office of the Surgeon General of the Army to support the Atlantic-Pacific Interoceanic Canal Study Commission in Panama?

A preventive medicine plan is now in use covering site surveys being made in the Darien region. According to the medical advisor to the field director for the Commission, said studies are being made for the most efficient methods of effecting a medico-ecology data collection to determine presence of disease vectors and possible communicable diseases in remote areas. Sea level canal engineering feasibility studies are also underway by Army engineers for possibility of eventual construction of a new canal. The studies are scheduled for presentation to the President in 1969. (5)

That there were 17,594 deaths due to emphysema in 1963 while only 3,010 deaths occurred in 1953?

One to 10 million Americans are afflicted to some degree by this disease which is more widespread than lung cancer and tuberculosis combined, and almost as prevalent as arthritis. Exposure to lung irritants, disease-producing organisms, polluted air, cigarette smoke, and allergic materials are thought to contribute to the development of emphysema. (6)

That a total of 20,479 canines received rabies protection in the recent anti-rabies campaign in Baltimore City and 5 surrounding counties from 15–22 May 1966?

The last rabid animal recorded in Baltimore was reported on 24 February 1947, and the last human fatality from rabies occurred on 21 March 1930. (7)

That the German Federal Government, the cities of Hilden and Wuerzburg and the German Foundation for Leprosy, financed a leprosy hospital with 86 beds, which opened recently at Baluba, Uganda, Central Africa (near Lake Victoria)? (8)

That 50 physicians and paramedical personnel from Schleswig-Holstein, Germany, volunteered to the German Red Cross at Kiel for appointments on the hospital ship, HELGOLAND, bound for Viet Nam?

The HELGOLAND requires 8 physicians and about 70 paramedical aides. (9)

That New York State's first alcoholism treatment unit for women was established in 1965 at Central Islip State Hospital, Long Island?

The 60-bed facility, one of the few specialized units of its kind in the country, will admit voluntary patients from the New York City metropolitan area. The intensive treatment program includes individual and group psychotherapy, occupational and recreational therapy, and religious counseling. (10)

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8. (Deutsch Aerztebl, 12 Mar 1966) JAMA 196(8):748/160, 23 May 1966.
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EDITORIAL DESK

TRI-SERVICE ORTHOPAEDIC SEMINAR

The Eighth Annual Armed Forces Tri-Service Orthopaedic Seminar will be held at the Vacation Village Hotel, San Diego, California, 18–22 September 1966. The U.S. Naval Hospital, San Diego, California will act as host. The theme of the 1966 Seminar will be the Management of Combat Injuries; however, papers on other Orthopaedic topics will also be presented. Anyone desiring to submit a paper for consideration by the Program Committee should immediately submit a summary of 200–300 words with two copies to Colonel George Chambers at Wilford Hall, U.S. Air Force Hospital, Lackland Air Force Base, Texas 78236.

Requests to attend this seminar should be submitted in accordance with BUMED INSTRUCTION 1520.8A. A Government air lift will be requested provided that participation warrants the use of same.

It is anticipated that rooms will be available at the Vacation Village Hotel at a rate of $14.00 or $7.00 a person. This hotel is in the heart of San Diego's Mission Bay area and is a sprawling motel type complex with excellent rooms.

NAVY'S SIXTH HIGHEST AWARD

National Naval Medical Center, Bethesda, Md. —The U.S. Navy's sixth highest award was presented 30 June 1966 to Rear Admiral Cecil L. Andrews, Medical Corps, USN during Change of Command Ceremonies at the National Naval Medical Center (NNMC), Bethesda. The Legion of Merit was presented to Admiral Andrews by Vice Admiral Robert B. Brown, Surgeon General, USN on behalf of President Johnson. The citation, which was presented to Admiral Andrews just minutes before he relinquished his helm as Commanding Officer of the Medical Center, stated: The President of the United States takes pleasure in presenting the LEGION OF MERIT to Admiral Andrews for service as set forth in the following citation: "For exceptionally meritorious service from January 1965 to June 1966 as Commanding Officer, National Naval Medical Center, Bethesda, Maryland. During this period, Admiral Andrews has distinguished himself and brought credit to the Navy through all aspects of his functions of command, most especially in the care of outpatients, the number of whom has steadily increased while the quality of care has improved. He has established the highest standards of medical care and has utilized outstanding management techniques, obtaining maximum results with available resources. He has also instituted a major program of rehabilitation of buildings and grounds which has been of such magnitude and character as to greatly improve the level of outpatient care, to increase the morale of the staff and to provide long range economy through the medium of preventive maintenance, as well as enhance the beauty of the Navy's Medical Center. By his outstanding leadership, judgement and inspiring devotion to duty, Admiral Andrews upheld the highest traditions of the United States Naval Service."

Admiral Andrews was relieved of command of the Medical Center and was retired after more than 36 years service in the Medical Corps of the U.S. Navy. Admiral and Mrs. Andrews will live in Gaithersburg, Maryland.

FEDERAL CIVIL SERVICE EMPLOYEE RECEIVES COMMENDATION FOR BLOOD DONATIONS

National Naval Medical Center, Bethesda, 13 June—Rear Admiral C. L. Andrews, MC USN Commanding Officer, National Naval Medical Center (NNMC) presents a certificate of commendation to Mr. Delbert W. Heinlein of 607 Marcia Lane, Rockville, Maryland. The certificate, given to

Mr. Heinlein for donating over 10 gallons of blood for a period spanning over 23 years, was presented on behalf of the Honorable Robert S. McNamara, Secretary of Defense. The certificate was presented in recognition of the outstanding contributions Mr. Heinlein has made to the Department of Defense Blood Program, Washington Region through donating 81 pints of his blood. This is the second letter of commendation signed by the Secretary of Defense that has been presented to him.

Mr. Heinlein, presently employed at the Naval Security Station, Washington, D.C., is a retired Chief Communications Technician in the U.S. Navy. He has received letters of appreciation for his donations while on active duty in such locales as Guam and the Hanson's Disease Colony in Moleki, Hawaii. Mr. Heinlein has donated 60 pints of his blood at the Medical Center.

EDITOR'S NOTE

"Missiles in the Heart" reprinted in this issue is a remarkable follow-up report and of tremendous importance to service medical officers, especially at this time. It is interesting to note that the considerable and possibly totally disabling "psychic trauma" as a result of retained fragments in the heart referred to by the authors was mentioned in the reports by Harkin et al (Amer Heart J 32: 1-19, 1946), as one of the indications for removal of some intracardiac foreign bodies.

The surgical management of intracardiac lesions by A. C. Beall Jr., H. F. Hamit, D. A. Cooley, and M. E. DeBakey was a lead article in the News Letter 25 June 1965 (Vol. 45, 12). Six instances of lacerated wounds in which total cardiopulmonary bypass was utilized in the repair are discussed in detail.

"Gun Shot Wounds of the Heart" is the title of a review of 31 cases by R. K. Richs, J. F. Howell, A. C. Beall, and M. E. DeBakey in Surg 57: 787-790 (June) 1965. The patients, all civilians, were treated at the Jefferson Davis Hospital (Baylor University College of Medicine). Twenty patients survived; 17 required cardiorrhaphy, eight after preliminary pericardiocentesis and only two of these died; 11 did not require surgery after pericardiocentesis, one of these died; specific treatment was unnecessary in three all of whom survived. Operative mortality was 59% but in the 19 in whom pericardiocentesis was done, there were only three deaths.

In a report of experience with 249 patients with penetrating wounds of the heart at the Harlem Hospital Center and the Columbus Hospital, New York, N.Y., E. A. Naclerio (Dis Chest 46: 1-22, July 1964) lists the immediate causes of death as (1) exsanguination, (2) cardiac tamponade, (3) interference with the conduction mechanism. As a result of his experience, he is convinced that thoracotomy with pericardiotomy and direct repair of the wound is the most effective method in the definitive treatment of penetrating cardiac wounds. Reasons for selecting surgery over conservative treatment with aspiration as definitive treatment are listed as follows:

(1) Without surgery, it is difficult to determine adequately whether site of injury is in ventricle, auricle, intrapericardial portion of the great vessels, pericardium alone, internal mammary or intercostal vessels.

(2) Type and extent of injury cannot be ascertained without thoracotomy.

(3) In about 50% of patients, large intrapericardial hemorrhagic clots are found which cannot be aspirated (possible false negative taps).

(4) Secondary hemorrhage.

(5) Possible dangers in aspiration to the heart, internal mammary vessels, peritoneum, pleura, or lungs.

(6) Possibility of incomplete evacuation of hemopericardium resulting in chronic effusions, adhesive pericarditis leading to constrictive pericarditis.

(7) Traumatic ventricular aneurysm development possible at epicardial opening or traumatic aneurysm of coronary vessel which may rupture.

(8) Pericardiocentesis essentially is a trial-and-error method.

An epidemiological study of multiple sclerosis in Israel has been carried out by Leibowitz et al. In Part II, "Multiple Sclerosis and Level of Sanitation," (J Neurol Neurosurg Psychiat 29: 6-68, Feb 1966), the authors suggest in their summary that multiple sclerosis might be the occasional complication of a widespread infection and that in environments with a higher sanitary level, infection may be postponed until an age when the central nervous system is more susceptible to the process which provokes demyelination.

ACADEMIC ACHIEVEMENTS BY MEDICAL SERVICE CORPS OFFICERS

Thirteen Medical Service Corps officers received degrees as indicated below during the Spring Convocation of the respective universities. The graduates are:

Doctor of Philosophy		
LT Leonard R. Green	ONR, Wash., D.C.	Boston Univ.
CDR Calman Levich	AFRRI, Bethesda, Md.	Catholic Univ.
Master's Degree Recipients		
LT Francis J. Redding (Health Care Administration)	NSHA, NNMC, Bethesda, Md.	The George Washington University (GWU)
LCDR Harry F. Ziegler, Jr. (Financial Management)	NavDisp., Wash., D.C.	GWU
Bachelor's Degree Recipients		
LT Donald E. Baker	PGS, Monterey, Calif.	GWU
LT John H. Gonsalves	Hdqtrs, 9th N.D.	Roosevelt Univ. Chicago, Ill.
LT Robert B. Hinds	PGS, Monterey, Calif.	GWU
LCDR Robert G. Hughes	BUMED	Univ. of Md.
LT John R. Kozik	BUMED	GWU
LTJG James J. Mason	USS TICONDEROGA (CVA–14)	Roosevelt Univ.
LCDR Robert E. Meyer	U.S. Naval Academy	GWU
LT Donald L. Siplon	U.S. Naval Hospital, Guam, M.I.	Roosevelt Univ.
LT Robert L. Surface	Military Blood Program Agency, Wash., D.C.	GWU

Approximately 150 MSC officers received BuMed sponsorship for part-time, off-duty courses of instruction in various institutions throughout the United States and overseas during the Spring Semester 1966. In addition, it is estimated that about 20 officers are pursuing part-time courses of study at their own expense. Approximately 60 MSC officers are currently enrolled for courses during the summer sessions at various universities.

TENTH ANNUAL SEMINAR ON PROPHYLAXIS AGAINST STREPTOCOCCAL INFECTIONS

The Tenth Annual Seminar on Prophylaxis against Streptococcal Infections sponsored by the Armed Forces Epidemiological Board will be held at Fort Leonard Wood, Missouri, on Monday and Tuesday, 10–11 October 1966. The Office of the Surgeon General, Department of the Army, will host this year's Seminar.

Activities desiring to send representatives to this Seminar should submit letter requests to BUMED, Attention Code 316, in accordance with BUMED Instruction 1520.8A as soon as possible.

MENINGOCOCCAL DISEASE, 1965.

Harry A. Feldman, MD, JAMA Vol 196(5):391/105, 2 May 1966, presents experience of last two years on isolations of sulfonamide-resistant meningococci from military and civilian populations, and treatment.—PrevMed,BuMed.

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